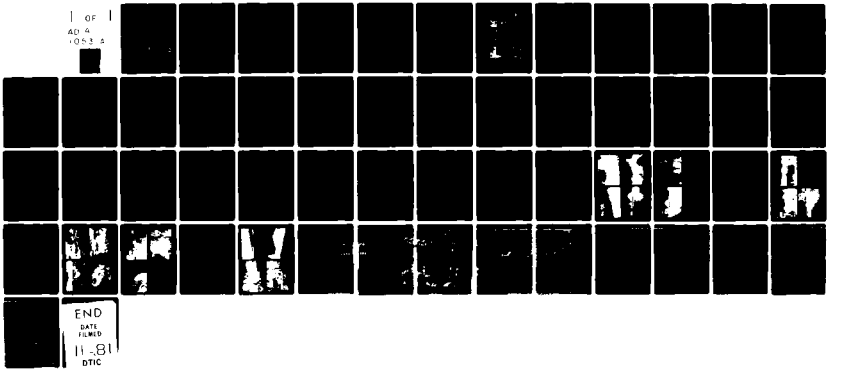
AD-A105 314 REITZ AND JENS INC ST LOUIS MO F/G 13/13
NATIONAL DAM SAFETY PROGRAM. GETTEMEIER LAKE DAM NO NAME 447 (M--ETC(U)
SEP 78 H M REITZ, J J BAILEY DACW43-78-C-0162
UNCLASSIFIED NL



END
DATE FILMED
11-81
DTIC

LEVEL

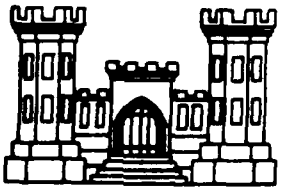
MISSOURI-KANSAS CITY BASIN

NO NAME 447

ST. CHARLES COUNTY, MISSOURI

MO 10796

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



PREPARED BY: U. S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

SEPTEMBER 1978

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A105 314 / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Dam Inspection Report National Dam Safety Program Gettemeier Lake Dam NO NAME 447 (MO 10796) St. Charles County, Missouri	5. TYPE OF REPORT & PERIOD COVERED Final Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Reitz & Jens, Inc.	8. CONTRACT OR GRANT NUMBER(s) DACW43-78-C-0162
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101	12. REPORT DATE September 1978 13. NUMBER OF PAGES Approximately 30
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for release; distribution unlimited.	
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)	
18. SUPPLEMENTARY NOTES	
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dam Safety, Lake, Dam Inspection, Private Dams	
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.	

(15) National Dam Safety Program. Gettemeier Lake Dam No Name 447 (MO 10796), Missouri - Kansas City Basin, St. Charles County, Missouri. Phase I Inspection Report.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

INSTRUCTIONS FOR PREPARATION OF REPORT DOCUMENTATION PAGE

RESPONSIBILITY. The controlling DoD office will be responsible for completion of the Report Documentation Page, DD Form 1473, in all technical reports prepared by or for DoD organizations.

CLASSIFICATION. Since this Report Documentation Page, DD Form 1473, is used in preparing announcements, bibliographies, and data banks, it should be unclassified if possible. If a classification is required, identify the classified items on the page by the appropriate symbol.

COMPLETION GUIDE

General. Make Blocks 1, 4, 5, 6, 7, 11, 13, 15, and 16 agree with the corresponding information on the report cover. Leave Blocks 2 and 3 blank.

Block 1. Report Number. Enter the unique alphanumeric report number shown on the cover.

Block 2. Government Accession No. Leave Blank. This space is for use by the Defense Documentation Center.

Block 3. Recipient's Catalog Number. Leave blank. This space is for the use of the report recipient to assist in future retrieval of the document.

Block 4. Title and Subtitle. Enter the title in all capital letters exactly as it appears on the publication. Titles should be unclassified whenever possible. Write out the English equivalent for Greek letters and mathematical symbols in the title *(see "Abstracting Scientific and Technical Reports of Defense-sponsored RDT/E," AD-667 000)*. If the report has a subtitle, this subtitle should follow the main title, be separated by a comma or semicolon if appropriate, and be initially capitalized. If a publication has a title in a foreign language, translate the title into English and follow the English translation with the title in the original language. Make every effort to simplify the title before publication.

Block 5. Type of Report and Period Covered. Indicate here whether report is interim, final, etc., and, if applicable, inclusive dates of period covered, such as the life of a contract covered in a final contractor report.

Block 6. Performing Organization Report Number. Only numbers other than the official report number shown in Block 1, such as series numbers for in-house reports or a contractor/grantee number assigned by him, will be placed in this space. If no such numbers are used, leave this space blank.

Block 7. Author*(s)*. Include corresponding information from the report cover. Give the name*(s)* of the author*(s)* in conventional order *(for example, John R. Doe or, if author prefers, J. Robert Doe)*. In addition, list the affiliation of an author if it differs from that of the performing organization.

Block 8. Contract or Grant Number*(s)*. For a contractor or grantee report, enter the complete contract or grant number*(s)* under which the work reported was accomplished. Leave blank in in-house reports.

Block 9. Performing Organization Name and Address. For in-house reports enter the name and address, including office symbol, of the performing activity. For contractor or grantee reports enter the name and address of the contractor or grantee who prepared the report and identify the appropriate corporate division, school, laboratory, etc., of the author. List city, state, and ZIP Code.

Block 10. Program Element, Project, Task Area, and Work Unit Numbers. Enter here the number code from the applicable Department of Defense form, such as the DD Form 1498, "Research and Technology Work Unit Summary" or the DD Form 1634, "Research and Development Planning Summary," which identifies the program element, project, task area, and work unit or equivalent under which the work was authorized.

Block 11. Controlling Office Name and Address. Enter the full, official name and address, including office symbol, of the controlling office. *(Equates to funding/sponsoring agency. For definition see DoD Directive 5200.20, "Distribution Statements on Technical Documents.")*

Block 12. Report Date. Enter here the day, month, and year or month and year as shown on the cover.

Block 13. Number of Pages. Enter the total number of pages.

Block 14. Monitoring Agency Name and Address *(if different from Controlling Office)*. For use when the controlling or funding office does not directly administer a project, contract, or grant, but delegates the administrative responsibility to another organization.

Blocks 15 & 15a. Security Classification of the Report: Declassification/Downgrading Schedule of the Report. Enter in 15 the highest classification of the report. If appropriate, enter in 15a the declassification/downgrading schedule of the report, using the abbreviations for declassification/downgrading schedules listed in paragraph 4-207 of DoD 5200.1-R.

Block 16. Distribution Statement of the Report. Insert here the applicable distribution statement of the report from DoD Directive 5200.20, "Distribution Statements on Technical Documents."

Block 17. Distribution Statement *(of the abstract entered in Block 20, if different from the distribution statement of the report)*. Insert here the applicable distribution statement of the abstract from DoD Directive 5200.20, "Distribution Statements on Technical Documents."

Block 18. Supplementary Notes. Enter information not included elsewhere but useful, such as: Prepared in cooperation with . . . Translation of *(or by)* . . . Presented at conference of . . . To be published in . . .

Block 19. Key Words. Select terms or short phrases that identify the principal subjects covered in the report, and are sufficiently specific and precise to be used as index entries for cataloging, conforming to standard terminology. The DoD "Thesaurus of Engineering and Scientific Terms" *(TEST)*, AD-672 000, can be helpful.

Block 20. Abstract. The abstract should be a brief *(not to exceed 200 words)* factual summary of the most significant information contained in the report. If possible, the abstract of a classified report should be unclassified and the abstract to an unclassified report should consist of publicly- releasable information. If the report contains a significant bibliography or literature survey, mention it here. For information on preparing abstracts see "Abstracting Scientific and Technical Reports of Defense-Sponsored RDT&E," AD-667 000.

☆ U.S. G.P.O. 1980-665-141 1299

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

SUBJECT: No-Name No. 447 Dam, MO ID No. 10796

This report presents the results of field inspection and evaluation of the No-Name No. 447 Dam. It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

1) Spillway will pass only 25 percent of the Probable Maximum Flood.

2) Overtopping could result in dam failure.

3) Dam failure significantly increases the hazard of loss of life down-valley.

SUBMITTED BY: SIGNED
Chief, Engineering Division

8 FEB 1979
Date

APPROVED BY: SIGNED
Colonel, CE, District Engineer

12 FEB 1979
Date

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam	No-Name 447
State Located	Missouri
County Located	St. Charles County
Stream	Tributary of Duckett Creek
Date of Inspection	4 September 1978

No-Name 447 dam was inspected by an interdisciplinary team of engineers from Reitz & Jens, Inc. ~~under contract with the St. Louis District Corps of~~ Engineers. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

The guidelines used in the assessment were furnished by the Department of the Army, Office of the Chief of Engineers and developed with the help of several Federal and State agencies, professional engineering organizations, and private engineers. Based on these guidelines, this dam is classified as a small dam with a high downstream hazard potential. The estimated damage zone from failure of the dam extends one mile downstream from the dam.

Failure would threaten the life and property of ten families and cause appreciable damage to one county road.

Our inspection and evaluation indicates that the dam is deficient in that the spillways do not meet the criteria set forth in the guidelines for a dam having the above size and hazard potential and which require that the spillway be capable of passing a one-half PMF (Probable Maximum Flood). The probable maximum flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in the region. The dam will begin to be overtopped by a flood having a discharge (peak and volume) equal to 25% of the PMF. The spillways will pass a 1% chance flood (100-year flood) without overtopping, which is a flood that has a 1% chance of being exceeded in any given year.

Other deficiencies found were lack of erosion protection on the emergency spillway and the lack of seepage and stability analyses.

We recommend the owner take action to correct or control the deficiencies described.

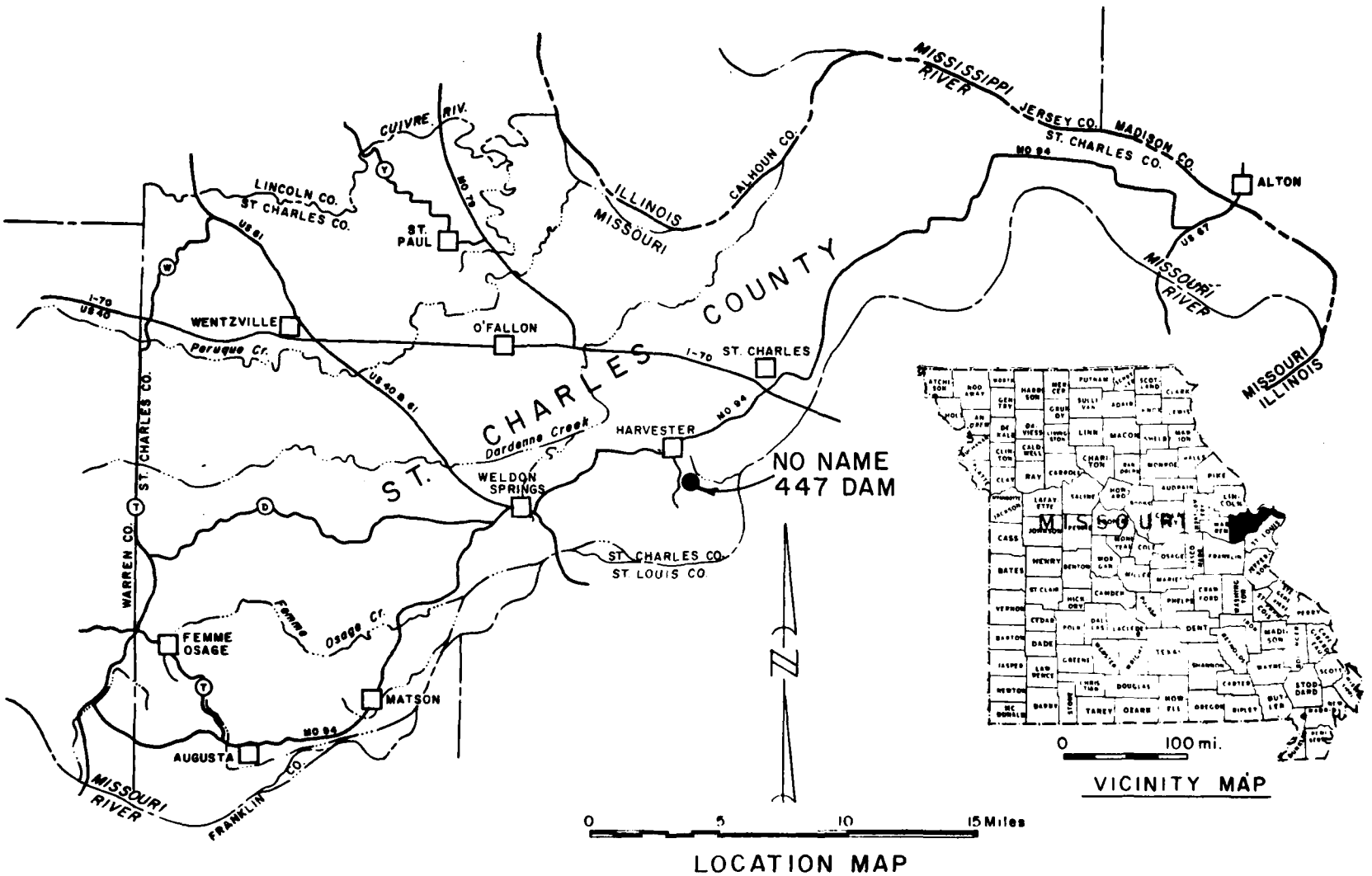
HENRY M. REITZ, President
Reitz & Jens, Inc.

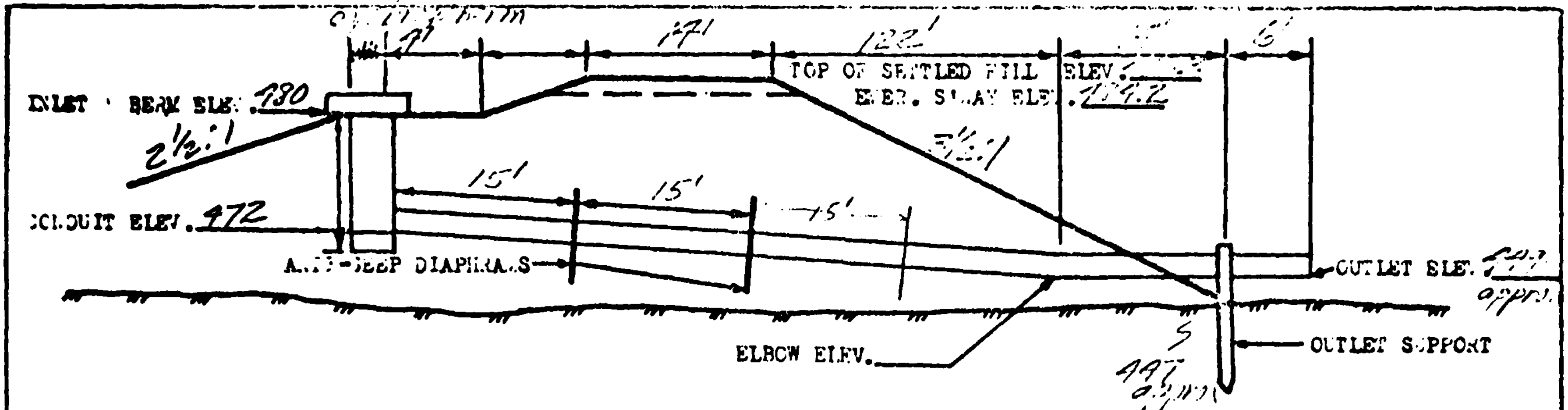
JOHN J. BAILEY, JR., Vice President
Chief Engineer
Reitz & Jens, Inc.

OVERVIEW – 10796

PLATE 1

PLATE 2


MISSISSIPPI RIVER
JERSEY CO.
MADISON CO.
ST. CHARLES CO.
ALTON
MO 94
US 67
MISSOURI RIVER
MISSOURI
ILLINOIS
CALHOUN CO.
ILLINOIS
MISSOURI
CULVRE RIV.
MO 79
LINCOLN CO.
ST CHARLES CO.
US 61
ST. PAUL
I-70
US 40
WENTZVILLE
O'FALLON
I-70
ST. CHARLES
COUNTY
ST. CHARLES
Peruque Cr.
US 40 & 61
Dardenne Creek
HARVESTER
MO 94
NO NAME
447 DAM
WELDON SPRINGS
ST. CHARLES CO.
ST. LOUIS CO.
WARREN CO.
ST. CHARLES CO.
Femme Osage Cr.
FEMME OSAGE
MATSON
MO 94
AUGUSTA
MISSOURI RIVER
FRANKLIN CO.
N
0 5 10 15 Miles
LOCATION MAP
MISSOURI
0 100 mi.
VICINITY MAP



PRELIMINARY ELEVATIONS AND QUANTITY ESTIMATES

Lower Site

Pipe
LENGTH *160* FT. SIZE *12* IN. TYPE *SIP*
LENGTH *10* FT. SIZE *18* IN. TYPE *SIP*
ANTI-VORTEX SIZE ___ TYPE *4 x 5½*
ANTI-SEEP DIAPHRAGM NO. *3* SIZE *5½* TYPE
ESTIMATE OF EARTH FILL SETTLED *22,954* C.Y.
ADA *71* POOL SIZE *4.4* RATIO *2/1*

NOTES AND COMMENTS:
Although pipe size [illegible] be reduced the cost would be greater at this location

BENCH MARK DESCRIPTION: *50400*
TBM #1 Elev. 504 x cut in footing of foundation at Northwest corner of small machine shed.

ENGINEER MAKING ESTIMATE *Pflantz* DATE *8/30/68*

Woodcliff Estates

Gettemeyer
NAME *[illegible]*
SEC.___ TWP.___ N. RANGE___ COUNTY___ *Built 1969*

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PRELIMINARY INFORMATION FOR STRUCTURES

NOT TO BE USED FOR CONSTRUCTION

PRINT FORM - MISSOURI - 3/66

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SCS-375 Rev. 4-63
Sheet 1 of ___
For In Service Use Only

PRELIMINARY GEOLOGIC INVESTIGATION OF DAM SITES

Watershed Missouri River Subwatershed Duckett Creek Site no. ____ County St. Charles State Mo.
(Chesterfield Quad.)
Location SW¼ NW¼ sec. 22, T.46 N., R.4 E. Site group ____ Structure class ____ Fund class ____
Nearest post office Harvester Landowner/operator Charles Ruff
Drainage area: ____ sq. mi. 91± acres. Purpose(s) of structure ____
Embankment: Length ____ ft. Height ____ ft. Cubic yards ____ Est. storage capacity ____ ac. ft.
This investigation made by: Inspection of surface X Hand auger X Test pits ____ Other(specify) ____
Investigated by: Thomas J. Dean (Signature and Title) August 5, 1963 (Date)

Thomas J. Dean, Engineering Geologist

GENERAL GEOLOGY

Physiographic description Glaciated Plains Geologic formation(s) Warsaw Formation
Attitude: Strike ____ Dip E
Direction of valley axis (downstream) N NE Steepness of abutments: Left ____ percent, Right ____ percent
Material of abutment and valley walls The left abutment consists of loess material with small amounts of chert and limestone gravels intermixed. The right valley has in excess of several feet of silt and silty clay with bedrock at unknown depths in the valley walls and bedrock cropping out in the stream bottom.
Surficial deposits ____
Faults, folds, joints, caverns and slide areas (describe briefly): No major faults or folds were noted however, jointing due to weathering can be observed in the stream bottom.
Depths to and kind of rock in foundation The left abutment may not reach rock in the core trench. The core trench in the valley bottom will be on and in bedrock and in the right abutment in excess of 3 or 4 feet.
Depth to groundwater ____ Date measured ____
Leakage problems No leakage problems are anticipated if an adequate core trench is embedded into unweathered limestone.

EMERGENCY SPILLWAY

Best location: Left abutment ____ Right abutment ____ Other ____
Estimated excavation: Volume ____ yds.; Percent rock ____; Suitable for fill? ____ Type ____ (GC, CL, etc.)
Erodibility of control section ____ (high, medium, low or very low) Erodibility of exit channel ____ (high, medium, low or very low)

STREAM OR OUTLET CHANNEL

Description: width ____ ft.; Depth ____ ft.; Bed material ____ *D ____ Size of bed material ____ in.
Channel: Scouring ____ Aggrading ____ Stable ____; Banks: Eroding ____ Stable ____

* Insert 50 or 75

(continued on reverse side)

BORROW AREAS

* Right valley wall and ridgetops

No. _____ Location * _____ Direction from dam _____ Distance _____ Probable depth _____ Area _____

Cubic yards available _____ Description of material Silts with varying amounts of clay intermixed.

Description of materials underlying borrow area _____

_____ Depth to water _____ Are salts or dispersed soils present? _____

. . . . . .

No. _____ Location _____ Direction from dam _____ Distance _____ Probable depth _____ Area _____

Cubic yards available _____ Description of material _____

Description of materials underlying borrow area _____

_____ Depth to water _____ Are salts or dispersed soils present? _____

SUMMARY OF FINDINGS, INTERPRETATIONS, AND CONCLUSIONS

This lake site situated in a tributary valley of Duckett Creek appears from a surficial geologic investigation to be a fine site for construction of a water retention dam. The natural sealant material available at the site is in excess of 3 or 4 feet and blankets most of the bedrock in the lake area. Jointed weathered limestone bedrock can be observed in the valley bottom in several places. However, this area can be filled with borrow material at hand to prevent downward percolation of water. If an adequate core trench can be constructed in the bedrock to a depth of several feet to intercept laterally moving water in the steep walled "V" shaped valley no leakage problems are anticipated.

The 91 acres of drainage should be sufficient to maintain a stable water level in a lake of 3 to 5 acres in size.

RECOMMENDATIONS FOR FURTHER INVESTIGATIONS

(Including type of equipment required and estimated cost)

See attached page.

PLATE 5
Sheet 2 of 3

Attach logs, sketches, maps and other pertinent data

GPO 802-777

Charles Ruff, SCS, St. Charles County

RECOMMENDATIONS FOR FURTHER INVESTIGATIONS

1. Several backhoe test pits should be excavated on the centerline of the dam at the right abutment and backslope to determine the depth of rock in the area of the first terrace above the stream bed and also the depth to rock in the valley wall near the right abutment. A backhoe may also be used to determine the availability and quality of borrow material on the waterline and on the ridgetops.

2. The core trench should be excavated deep enough into the bedrock to intersect all weathered jointed bedrock. Fresh silty clay should be packed on this firm fresh unweathered bedrock to intercept any lateral movement of water from upstream sources laterally toward the dam. If no bedrock is intercepted on the right or left abutment a core trench of 3 to 4 feet should be sufficient.

3. If bedrock is encountered at a shallow depth on the first terrace near the right abutment the material overlying the rock terrace should not be used as borrow material. This natural sealant material should be left in place and compacted by routing construction equipment selectively through the area.

4. The stream bed should be filled with silty clay borrow material upstream for 100 or 150 feet above the dam to prevent water from entering the weathered jointed bedrock.

Thomas J. Dean

Thomas J. Dean
Engineering Geologist
Missouri Geological Survey
August 13, 1968

PLATE 5
Sheet 3 of 3

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
No-Name 447 Dam, MO ID No. 10796

TABLE OF CONTENTS

Paragraph No.	Title	Page No.
	SECTION 1 - PROJECT INFORMATION	
1.1	General	1
1.2	Description of Project	1
1.3	Pertinent Data	2
	SECTION 2 - ENGINEERING DATA	
2.1	Design	5
2.2	Construction	5
2.3	Operation	5
2.4	Evaluation	5
	SECTION 3 - VISUAL INSPECTION	
3.1	Findings	7
3.2	Evaluation	8
	SECTION 4 - OPERATIONAL PROCEDURES	
4.1	Procedures	9
4.2	Maintenance of Dam	9
4.3	Maintenance of Operating Facilities	9
4.4	Description of Any Warning System in Effect	9
4.5	Evaluation	9
	SECTION 5 - HYDRAULIC/HYDROLOGIC	
5.1	Evaluation of Features	10
	SECTION 6 - STRUCTURAL STABILITY	
6.1	Evaluation of Structural Stability	11
	SECTION 7 - ASSESSMENT/REMEDIAL MEASURES	
7.1	Dam Assessment	12
7.2	Remedial Measures	12
	APPENDIX	
A	Hydrologic Computations	

TABLE OF CONTENTS
(Cont.)

LIST OF PLATES

Plate No.		Title
1		Overview - Lake and Environs
2		Location and Vicinity Map
3		Plan and Profile Sheet (in pocket on back cover)
4		SCS Preliminary Information for Structures
5	(3 sheets)	SCS Preliminary Geologic Investigation of Dam Sites

LIST OF INDICES AND PHOTOGRAPH NUMBERS

Index No.	Title
1	Index of Dam Photos (D-1 through D-6)
2	Index of Panorama Photos (P-1 through P-3)
3	Index of Spillway Photos (S-1 through S-7)
4	Index of Valley Below Dam Photos (V-1 through V-4)

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer contracted with Reitz & Jens, Inc. (Contract DACW43-78-C-0162) for a safety inspection of the No Name 447 Dam, MO ID No. 10796.

b. Purpose of Inspection. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

c. Evaluation Criteria. Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams " (Appendix D). These guidelines were developed with help of several Federal agencies and many State agencies, professional engineering organizations, and private engineers.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances The dam is built in a deeply eroded draw in the rolling uplands along the Missouri River.

Soils in the watershed are Menfro Silt Loam derived from a thick loess and considered to be in Hydrologic Soil Group "B". Ground slopes in the watershed average 12%. The present land use in the watershed is about 10% cultivated, 10% relatively dense subdivision development, and 20% low density subdivision development. Another 60% of the watershed presently in pasture or fallow will, in the inspection team's opinion, be developed to fairly high density subdivisions in the next five to ten years because this area is within the rapidly developing environs of St. Charles, Missouri. It is estimated the final development will be 75% high density residential development with about 25% impervious area and 20% low density development with possibly 10% impervious area.

The dam runs essentially in an east/west direction; the lake lies in a southwesterly direction from the dam, along the general trend of the watershed which is in the same direction. There is a steel drop pipe with steeply sloping steel drawdown tube south of Station 3+50. An emergency spillway is provided on the west end of the dam.

Upstream there are two small impoundments, each less than one acre in size. One of these is shown on the photo revision of the USGS Chesterfield Quadrangle.

Topography in the vicinity of the dam is shown on Plate 3.

b. Location The dam is located in south central St. Charles County about 1.2 miles south-southeast of the village of Harvester as shown on Plate 2. The dam and lake are located in the SW¼ of the NW¼ of Fractional Section 22 T46N, R4E and are not shown on the Missouri, St. Charles, St. Louis County, Chesterfield Quadrangle Sheet, 1972 Edition. A portion of this sheet is reproduced on Plate 3.

c. Size Classification Criteria for determining the size classification of dams and impoundments are presented in the guidelines referenced in paragraph 1.1c above. Based on these criteria, this dam and impoundment is in the Small Size Category.

d. Hazard Classification Guidelines for determining hazard classification are presented in the same guidelines as referenced in paragraph c above. Based on referenced guidelines, this dam in in the High Hazard Classification.

e. Ownership The dam is owned by Mr. Gene Gettemeier, 515 Jung Station Road, St. Charles, Missouri 63301.

f. Purpose of Dam The dam forms a 5-acre recreational lake.

g. Design and Construction History The inspection team was unable to find any design on this dam except as described in paragraph 2.1. It was reported that construction on the dam began in 1968 and water impoundment commenced in 1969. Two attempts were made to obtain design and construction data from the engineer reported to have designed the dam without success.

h. Normal Operating Procedure Normal rainfall, runoff, transpiration, and evaporation all combine to maintain a relatively stable water surface elevation.

1.3 PERTINENT DATA

a. Drainage Area - 94 acres measured on 1977 aerial photography.

b. Discharge at Damsite

(1) All discharge at the damsite is through uncontrolled spillways.

(2) Estimated experienced maximum flood at damsite - unknown.

(3) Estimated ungated spillway capacity at maximum pool elevation

(a) Drop pipe and drawdown tube - 14.1 cfs

(b) Emergency Spillway - 5.5 cfs

(c) Total - 19.6 cfs

c. Elevation (Feet Above M.S.L.)

(1) Top of dam - 535.6 (See Plate 3).

(2) Spillway crest -

(a) Primary spillway drop pipe - 530.0

(b) Emergency spillway - 535.1

(3) Streambed at centerline of dam - 497 from survey

(4) Maximum tailwater - unknown

d. Reservoir Length of maximum pool - 1100 feet ± at spillway crest.

e. Storage (Acre-Feet)

(1) Top of dam - 94 acre feet

(2) Normal pool - 59 acre feet

f. Reservoir Surface (Acres)

(1) Top of dam - 7.1 Acres (estimated)

(2) Spillway crest - 5.05 Acres

g. Dam

(1) Type - earth embankment.

(2) Length - 500 feet

(3) Height - 39 feet maximum (from survey)

(4) Top width - 13 feet ±

(5) Side Slopes -

(a) Downstream - 1V on 4H (determined from section at Station 3+50 (See Plate 3).

(b) Upstream - 1V on 2H to water surface from section at Station 3+50 (see Plate 3).

(6) Zoning - unknown

(7) Impervious core - unknown

(8) Cutoff - unknown

(9) Grout curtain - unknown

h. Diversion and Regulating Tunnel None

i. Spillways - The Principal Spillway is 20-inch diameter droppipe and 12-inch outlet through dam.

The emergency spillway has a flat "V" shaped channel with 20:1 side slopes. This flowline is only 0.5 feet below the low point of the dam crest.

j. Regulating Outlets None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The USDA-SCS apparently furnished advice during design and construction of this dam. The SCS has on file a preliminary information sheet for this structure. This was marked "Not to be used for construction". It is believed, however, that this design was, to some extent, followed in construction of the dam. This drawing is reproduced as Plate 4.

In addition, the inspection team has received a copy of Form SCS-375 "Preliminary Geologic Investigation of Damsites", which although incomplete with regard to the emergency spillway and its outlet channel, does address the permeability of the reservoir in underlying limestone. This is reproduced as Plate 5. Subdivision plans on file with the St. Charles County Planning Commission and St. Charles County Highway Department do not include details of the dam.

2.2 CONSTRUCTION

The dam was constructed in 1969, according to information received from the SCS. Also on hand are what appear to be preliminary estimates of quantities dated August 30, 1968. Mr. Charles Ruff is indicated to have been engineer, owner or developer of the subdivision.

2.3 OPERATION

There are no facilities requiring operation at the dam. No records of operation have been obtained by the inspection team.

The maximum loading on the dam is unknown. The lake level seems to remain stable during average precipitation of 38 inches per year. There are no records of operation of the dam.

It does not appear that flow through the emergency spillway has occurred since completion of the dam.

2.4 EVALUATION

a. Availability A single preliminary sketch and a geologist's report are the only design records available to the inspection team, although there may be other records in private files that were not made available to the inspection team. Seepage and stability analyses comparable to the requirements of "Recommended Guidelines for Safety Inspection of Dams" were not available which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions (including earthquake loads) and made a matter of record.

b. Adequacy Complete engineering data not being available, no detailed assessment of the design, construction and operation could be made. However, the design appears to be the standard SCS practice for this type and size of structure. If the preliminary design was followed, the dam would probably have been provided with a cutoff trench sealed in the rock and a steel drawdown tube with three anti-seep diaphragms 5-1/2 feet square.

However, for the size of dam, materials used and measurements taken, a hydrologic/hydraulic evaluation indicated the dam would start to be overtopped at 25% of the Probable Maximum Flood.

Also, for the section and the presence of the primary spillway plus the visual inspection of a dam with reservoir approximately 9 years of age, the generally good condition of the dam, when considered by the experienced engineers, indicated that even though a detailed assessment of the design and construction in an analytical sense was not possible, an evaluation of the dam as a structure, was feasible and indicated an acceptable dam section.

c. Validity The data found were only valid for information as to proposed construction. No "as-built" drawings or construction records were made available to the inspection team.

This report is primarily for safety through maintenance and operation and the conclusions and evaluation for this Phase I Inspection are considered adequate for the definitive statement in this report.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General A visual inspection of No-Name No. 447 dam was made on 4 September 1978. Three days of field measurements by a survey party were on 31 August, 1 September and 14 September 1978. The training and experience of personnel in these inspections included hydrologic/hydraulic engineering, soils and materials engineering, surveying and structural engineering. Specific observations are discussed below.

b. Dam The grade of the crest of the dam is relatively uniform (photos D-4, D-5) except at the spillway at the west end, where the crest is approximately two feet higher than the crest for several hundred feet to the east (the higher part of the dam). This gives illusion of a spillway depth of approximately three feet but, in reality, the flowline of the emergency spillway is only about one-half foot below the top of the dam.

The upstream slope of the dam has no erosion resistant wave protection. Since the earth used to build the dam is of eolian (windblown) origin and easily erodible, the need for a resistant armor coating to prevent wave damage is mandatory. No signs of burrowing animals were seen.

The downstream slope of the dam was covered with a healthy growth of low grass (D-1, D-2) as was the upstream slope (D-3, D-4, D-5). Neither slope had underbrush or larger growth as compared with grass. Between the portion of the dam alignment where the spillway had been cut into virgin ground and substantial fill sections of the dam, a large oak (dying in the upper branches) is standing (D-3, D-4). The downstream slope of the dam, for its height of approximately 35 feet, is regular and has no visible indications of non-uniformity as far as surface configuration. At the west end of the dam, grades were very rough (S-3, S-4) and had not been dressed to form a spillway location. Indications are that even though this is a cut area, the soils in the bottom can be easily eroded in a barren part of the section near the west end. In the roadway path used by vehicles, a line of holes (D-6) suggested potential instability. This line of holes, origin not capable of explanation, may be either in the shallowest part of the dam embankment or contiguous with its contact to the natural terrain. Also, near both ends of the dam embankment, manhole covers were visible (S-3, S-4, S-7) indicating underground sewers. These manhole covers are on sanitary sewer lines which run downslope on the downstream side of the dam at approximately the alignment where the dam came in contact with the original topography. These sewer trenches suggest a serious potential for erosive piping along the outside of the sewer pipes. No hydrophilic plants or other signs related to underseepage or through-seepage were noted on or below the downstream face of the dam.

c. Appurtenant Structures The primary spillway consists of a 20-inch diameter steel droppipe with a vertical anti-vortex baffle at intake controlled lake level (S-5, D-3, D-5). The apparent intended emergency spillway at the west end of the embankment was ill-defined, at best (S-2, S-3, S-4).

d. Reservoir Area No wave-wash was visible either on the lake side of the dam (D-3) or around the bank of the lake in virgin soil locations (D-2). The lack of apparent effort to develop an actual emergency spillway location, as referred to above, is glaring.

e. Downstream Channel Immediately downstream from the dam the channel is as indicated on photos V-1 through V-4. However, development in Duckett Creek is potentially impacted by this reservoir because the dam has been built across a tributary watershed to Duckett Creek.

3.2 EVALUATION

The presence of only 0.5 foot difference between much of the dam's length and the low point on the spillway and lack of any real delineation of a spillway section or channel indicate the need for immediate remedial action to eliminate a serious potential of failure. The easily eroded characteristics of the soils, which are of eolian (windblown) origin and therefore, tend to be of low to possibly no plasticity, both used to build the dam and natural soils in the sides of the valley, require that emergency spillways be promptly improved as to capacity. Sufficient freeboard to protect this dam from being overtopped should be provided because of the high probability of breaching failure of the dam embankment by erosion should overtopping flows occur.

The lack of erosion protection on the upstream slope, the sanitary sewer alignments at the edge of the dam and the line of holes at the west end of the dam in the windblown soils, all require protective devices or measures to prevent erosion both in the dam and natural soils.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no controlled outlet works for this dam; therefore, no regulating procedures exist. The pool is controlled by rainfall, runoff, evaporation, and capacity of the uncontrolled spillway.

4.2 MAINTENANCE OF DAM.

The vegetation on the dam appears to have been mowed at sufficient intervals to prevent growth of trees and brush. The emergency spillway channel is rough and uneven. The droppipe and spillway appear to be in good condition. Some trash appeared to have been dropped or thrown into the droppipe partially blocking it.

4.3 MAINTENANCE OF OPERATING FACILITIES

No operating facilities exist at this dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

The inspection team is not aware of any existing warning system for this dam.

4.5 EVALUATION

Maintenance of the dam has been adequate. Continued attention to mowing the growth on the dam is necessary to prevent start of tree and brush growth. The droppipe and pipe through the dam should be kept clean and free of debris. If this is seriously obstructed a serious potential of failure could occur from overtopping of the dam.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data No design data are available.

b. Experience Data The drainage area is 94 acres and was developed from USGS Chesterfield Missouri Quadrangle. Also available are 1"=2000' aerial stereo pairs taken April 6, 1977, by Surdex Corporation. Lake area is measured on a 1"=200' enlargement of a portion of one of these photographs and shown on Plate 1. The spillway and dam layout are from surveys made during the inspection.

c. Visual Observations

(1) Principal spillway droppipe (20 inches) and outlet pipe are in good condition.

(2) The emergency spillway channel is located at the west end of the dam. It is an unlined V-shaped earth channel with 20 to 1 side slopes. The flowline is only 0.5 foot below the lowest part of the dam crest.

(3) No drawdown facilities are available to evacuate the pool.

(4) Maximum emergency spillway releases may endanger the integrity of the dam. However, the dam will be overtopped before any appreciable emergency spillway flow occurs.

d. Overtopping Potential Hydrologic and hydraulic computations appear in Appendix A. The spillways are too small to pass the minimum required flood of one-half the Probable Maximum without overtopping. The Probable Maximum Flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions reasonably possible in the region. The dam will start to be overtopped by a flood equal to 25% of the PMF. The one-half PMF will overtop the dam to a maximum depth of about 1.0 foot. The depth will vary to zero across the dam because of the sloping crest. Erosion of the downstream face of the dam would start with overtopping. If the duration of overtopping was sufficient it would result in breaching the dam. A width of 300 feet of dam crest will be subject to some overtopping flow. Maximum rate of flow over the dam crest will be about 510 cubi c feet per second and about 220 cfs will be passed by the spillways. Overtopping flow will have a duration of about 6 hours. The existing lake and principal spillway will contain a 100-year frequency flood below the crest of the emergency spillway.

Failure of upstream water impoundments described in Paragraph 1.2.a would not have a significant impact on the hydrologic or hydraulic analysis.

The effect from rupture of the dam could extend approximately one mile downstream of the dam. There are 10 inhabited homes downstream of the dam which could be severely damaged and lives of the inhabitants lost should failure of the dam occur.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations Visual observations which adversely affect the structural stability of this dam are discussed in Section 3, paragraph 3.1.b.

b. Design and Construction Data No design or construction data relating to seepage and stability analysis were found.

c. Operating Records No appurtenant structures requiring operation exist at this dam.

d. Post Construction Changes No post construction changes exist which will affect structural stability of the dam.

e. Seismic Stability A detailed seismic analysis is beyond the scope of a Phase I Inspection. Considering the seismic zone (2) in which this dam is located, an earthquake of these parameters is not expected to cause a structural failure of this dam. A detailed seismic analysis is not recommended.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety The spillways are inadequate to pass the required one-half Probable Maximum Flood (PMF).

The reservoir and principal spillway are adequate to contain a flood which has a 1% chance of being exceeded (100-year flood) in any given year.

Erosion protection for the emergency spillway is deficient.

The upstream slope of the dam has no erosion resistant wave protection. Since the earth used to build the dam is of eolian (windblown) origin and easily erodible, the need for a resistant armor coating to prevent wave damage is mandatory.

The stability of and seepage conditions on the downstream slope should be investigated by an engineer experienced in the design of dams.

b. Adequacy of Information Due to lack of engineering design and construction data, the conclusions in this report were based on performance history and external visual conditions. The inspection team considers these data sufficient to support the conclusions herein.

Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available which is considered a deficiency.

c. Urgency The remedial measures recommended in paragraph 7.2 should be accomplished in the near future. Priority should be given to providing an adequate capacity erosion resistant spillway. If the safety deficiencies listed in paragraph a are not corrected in the near future, they will continue to deteriorate and lead to a serious potential of failure.

d. Necessity for Phase II Based on the results of the Phase I Inspection, no Phase II Inspection is recommended.

e. Seismic Stability This dam is located in Seismic Zone 2. An earthquake of this magnitude is not expected to be hazardous to this dam. A detailed seismic analysis is not recommended.

7.2 REMEDIAL MEASURES

a. Alternatives Emergency spillway size and/or height of dam should be increased to prevent overtopping by a one-half probable maximum flood. In either case, the spillway should be protected to prevent erosion. The owner should obtain the services of an experienced engineer to design and observe construction of these remedial measures.

b. Stability and Seepage Analyses The owner should have an engineer experienced in design and construction of dams prepare seepage and stability analyses.

c. O&M Maintenance and Procedures The following O&M maintenance and procedures are recommended:

(1) Continue mowing vegetation growth on the slopes of the dam.

(2) Periodically check the condition of the 12-inch steel pipe through the dam for evidence of corrosion and leakage. Water leaking into or out of a corroded principal spillway pipe could cause piping failure of the earth embankment.

(3) Maintain a trash rack at the inlet of the principal spillway. Remove accumulations of trash which, if left in place, could eventually greatly reduce the capacity of the pipe.

(4) Maintain an erosive-resistant sill in the control section of the spillway and remove the humps and irregularities in the spillway channel.

(5) The owner should keep a record of all future repairs and maintenance.

(6) After completion of the remedial measures, detailed inspections of the dam should be made periodically by an engineer experienced in the design and construction of dams.

(7) The purported 2-inch steel pipe is through the dam. It has not been found. A qualified technician using a metal detector might find the pipe and valve if the soil cover over it is 3 feet or less. Efforts should be made to find the pipe and determine if it is corroding or leaking.

APPENDIX A

HYDROLOGIC COMPUTATIONS

HYDROLOGIC AND HYDRAULIC ANALYSIS METHODOLOGY

1. The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for a reservoir routing. The Probable Maximum Precipitation for those dams in the high hazard potential category is derived and determined from regional charts prepared by the National Weather Service in "Hydrometeorological Report No. 33". Reduction factors have not been applied. A 24-hour storm duration is assumed with the 24-hour rainfall depths distributed over 6-hour periods in accordance with procedures outlined in EM 1110-2-1411 (SPF Determination). The maximum 6-hour rainfall period is then distributed to hourly increments by the same criteria. Within-the-hour distribution is based upon NOAA Technical Memorandum NWS HYDRO-35. The non-peak 6-hour rainfall periods are distributed uniformly. All distributed values are arranged in a critical sequence by the SPF criteria. The final inflow hydrograph is produced by deduction of infiltration losses appropriate to the soil, land use and antecedent moisture conditions.

2. The reservoir routing is accomplished by using Modified Puls routing techniques wherein the flood hydrograph is routed through lake storage. Hydraulic capacities of the spillways and crest of dam are used as outlet controls in the routing. Storage in the pool area is defined by an elevation-area curve. The hydraulic capacity of the spillways and the sloping top of dam is defined by a composice elevation discharge curve.

3. Dam overtopping analysis has been conducted by hydrologic methods for this dam and lake. This computation determines the percentage of the PMF hydrograph that the reservoir can contain without the dam being overtopped. An output summary in the hydrologic appendix displays this information as well as other characteristics of the simulated dam overtopping.

4. The above methodology has been accomplished for this report using the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. The numeric parameters estimated for this site are listed on Plate 1A. Definitions of these variables are contained in the "User's Manual" for the computer program.

5. At heads less than 0.6-foot capacity of the principal spillway is determined by the flow over the rim of the drop tube behaving as a sharp-crested weir. Length was assumed as the perimeter of the pipe and a discharge coefficient of 3.3 was used. At higher heads (above 1.0 foot) the hydraulic control is at the entrance to the 12-inch pipe through the dam at the bottom of the drop tube. The head discharge relationship is determined by allowing one velocity head for energy in the 12-inch pipe and 0.5 velocity head for entrance losses at the upper end of the 12 inch pipe. Friction, velocity head and entrance loss in the drop tube are added to give a total head above the top of the 12-inch pipe of 1.65 velocity heads.

6. The emergency spillway was calculated using critical velocity at the centerline of the dam. To allow for friction, velocity distribution and transition losses, 0.2 velocity head was added. Flow over the sloping top of the dam was calculated using a coefficient of discharge of 3.0, the broad-crested weir equation. About 225 feet of dam is within 0.3-foot of the lowest part. The remainder is at varying higher elevations. All principal spillway, emergency spillway and overtopping discharge was included in a composite rating curve. Dummy values of 0.1 for dam length, coefficient of discharge and exponent were entered on the $D card to suppress diagnostic statements in the output. The amount of this dummy flow is never greater than 0.02 cfs.

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  3 AUG 78
**********
    1                A  ********** ID # 10796 NO NAME # 447 ** ADD 430 FOR USGS ELEV *******
    2                A  ********** DAM SAFETY PROGRAM - U. S. CORPS OF ENGINEERS **********
    3                A  ********** REITZ & JENS, INC. -     AUGUST 1978 **********
    4                R    288       0       5      -0      -0      -0      -0      -0      -4      -0
    5                1      5
    6                J      1       9       1
    7                J1  0.10    0.15    0.20    0.25    0.30    0.35    0.40    0.50    1.00
    8                K      0   PMF                         1       3       1
    9                1  ***** INFLOW HYDROGRAPH - SCS METHOD *****
   10                M      1       2   0.144                       1                       1
   11                P             24.8     101     120     130
   12                T                                                       -1      -76             0.28
   13                M2            0.20
   14                X            -0.10     2.0
   15                K      1      03                          1               1
   16                1  ***** RESERVOIR ROUTING - RATING CURVE SUPPLIED - INCLUDES DAM ****
   17                Y                                  1       1
   18                Y1     1                                           -100.3      -1
   19                Y4 100.0   100.1   100.3   100.6   101.0   102.0   105.1   105.6   105.8   106.0
   20                Y4 106.2   106.5   107.0   107.5   108.0
   21                Y5   0.0     0.5     2.8     7.9    10.2    11.8    13.8    19.6      45     122
   22                Y5   266     576    1303    2216    3553
   23                $A  0.00    5.05   10.10   11.94
   24                $F    65     100     110     120
   25                $$ 100.0
   26                $D 105.6     0.1     0.1     0.1
   27                K     99
```

PLATE A-1
Sheet 1 of 5

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  3 AUG 78
**********************************

RUN  DATE= 10/02/78.
     TIME= 16.15.22.


 * ********** ID # 10796 NO NAME # 447 ** ADD 430 FOR USGS ELEV ********
  ********** DAM SAFETY PROGRAM - U. S. CORPS OF ENGINEERS ***********
  ********** BEITZ & JENS, INC. -    AUGUST 1978 **********************

                                JOB SPECIFICATION
      NO      NHR     NMIN     IDAY     IHR     IMIN    METRC     IPLT     IPRT    NSTAN
     288       0        5       -0      -0       -0       -0       -0       -4       -0
                              JOPER      NWT    LROPT    TRACE
                                 5       -0       -0       -0


                          MULTI-PLAN ANALYSES TO BE PERFORMED
                                NPLAN= 1  NRTIO= 9  LRTIO= 1
          RTIOS=     .10     .15     .20     .25     .30     .35     .40     .50    1.00


**********          **********          **********          **********          **********

                          SUB-AREA RUNOFF COMPUTATION

     ***** INFLOW HYDROGRAPH - SCS METHOD *****
                    ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE  IAUTO
                     PME       0      -0      -0       1       3       1      -0      -0

                                HYDROGRAPH DATA
          IHYDG    IUHG    TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
              1       2      .15   -0.00     .15    1.00  -0.000      -0       1      -0

                                PRECIP DATA
                    SPFE     PMS      P6     P12     P24     P48     P72     P96
                   -0.00   24.80  101.00  120.00  130.00   -0.00   -0.00   -0.00

                                LOSS DATA
          LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
             -0   -0.00   -0.00    1.00   -0.00   -0.00    1.00   -1.00  -76.00   -0.00     .20

          CURVE NO =  -76.00  WETNESS =   -1.00  EFFECTION =   76.00

                             UNIT HYDROGRAPH DATA
                          TC= -0.00    LAG=   .20

                                RECESSION DATA
                          STRTQ=   -0.00    QRCSN=    -.10    RTIOR= 2.00

          UNIT HYDROGRAPH 14 END OF PERIOD ORDINATES, TC=   -0.00 HOURS, LAG=    .20  VOL= 1.00
           71.     235.     291.     233.     129.      74.      42.      24.      14.       8.
            4.       3.       2.       1.

     0
   MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS     COMP Q       MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS     COMP Q
```

PLATE A-1
Sheet 2 of 5

STRTQ= -0 0 QRCSN= -.10 RTIO= 2.00

UNIT HYDROGRAPH 14 END OF PERIOD ORDINATES, TC= -0.00 HOURS, LAG= .20 VOL= 1.00

71. 235. 291. 233. 129. 74. 42. 24. 14. 8.
4. 3. 2. 1.

0 MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	.00	.01	0.	1.01	12.05	145	.21	.19	.02	75.
1.01	.10	2	.01	.00	.01	1.	1.01	12.10	146	.21	.19	.02	105.
1.01	.15	3	.01	.00	.01	2.	1.01	12.15	147	.21	.19	.02	143.
1.01	.20	4	.01	.00	.01	3.	1.01	12.20	148	.21	.19	.02	174.
1.01	.25	5	.01	.00	.01	4.	1.01	12.25	149	.21	.19	.02	191.
1.01	.30	6	.01	.00	.01	4.	1.01	12.30	150	.21	.19	.02	202.
1.01	.35	7	.01	.00	.01	4.	1.01	12.35	151	.21	.19	.02	208.
1.01	.40	8	.01	.00	.01	4.	1.01	12.40	152	.21	.19	.02	212.
1.01	.45	9	.01	.00	.01	4.	1.01	12.45	153	.21	.19	.01	215.
1.01	.50	10	.01	.00	.01	4.	1.01	12.50	154	.21	.19	.01	216.
1.01	.55	11	.01	.00	.01	4.	1.01	12.55	155	.21	.19	.01	218.
1.01	1.00	12	.01	.00	.01	4.	1.01	13.00	156	.21	.20	.01	219.
1.01	1.05	13	.01	.00	.01	4.	1.01	13.05	157	.25	.24	.02	222.
1.01	1.10	14	.01	.00	.01	4.	1.01	13.10	158	.25	.24	.01	232.
1.01	1.15	15	.01	.00	.01	4.	1.01	13.15	159	.25	.24	.01	244.
1.01	1.20	16	.01	.00	.01	4.	1.01	13.20	160	.25	.24	.01	254.
1.01	1.25	17	.01	.00	.01	4.	1.01	13.25	161	.25	.24	.01	260.
1.01	1.30	18	.01	.00	.01	4.	1.01	13.30	162	.25	.24	.01	264.
1.01	1.35	19	.01	.00	.01	4.	1.01	13.35	163	.25	.24	.01	266.
1.01	1.40	20	.01	.00	.01	4.	1.01	13.40	164	.25	.24	.01	267.
1.01	1.45	21	.01	.00	.01	4.	1.01	13.45	165	.25	.24	.01	269.
1.01	1.50	22	.01	.00	.01	4.	1.01	13.50	166	.25	.24	.01	269.
1.01	1.55	23	.01	.00	.01	4.	1.01	13.55	167	.25	.24	.01	270.
1.01	2.00	24	.01	.00	.01	4.	1.01	14.00	168	.25	.24	.01	271.
1.01	2.05	25	.01	.00	.01	4.	1.01	14.05	169	.31	.30	.01	276.
1.01	2.10	26	.01	.00	.01	4.	1.01	14.10	170	.31	.30	.01	290.
1.01	2.15	27	.01	.00	.01	4.	1.01	14.15	171	.31	.30	.01	308.
1.01	2.20	28	.01	.00	.01	4.	1.01	14.20	172	.31	.30	.01	323.
1.01	2.25	29	.01	.00	.01	4.	1.01	14.25	173	.31	.30	.01	331.
1.01	2.30	30	.01	.00	.01	4.	1.01	14.30	174	.31	.30	.01	336.
1.01	2.35	31	.01	.00	.01	4.	1.01	14.35	175	.31	.30	.01	339.
1.01	2.40	32	.01	.00	.01	4.	1.01	14.40	176	.31	.30	.01	341.
1.01	2.45	33	.01	.00	.01	4.	1.01	14.45	177	.31	.30	.01	342.
1.01	2.50	34	.01	.00	.01	4.	1.01	14.50	178	.31	.31	.01	343.
1.01	2.55	35	.01	.00	.01	4.	1.01	14.55	179	.31	.31	.01	344.
1.01	3.00	36	.01	.00	.01	4.	1.01	15.00	180	.31	.31	.01	344.
1.01	3.05	37	.01	.00	.01	4.	1.01	15.05	181	.19	.19	.00	336.
1.01	3.10	38	.01	.00	.01	4.	1.01	15.10	182	.38	.37	.01	322.
1.01	3.15	39	.01	.00	.01	4.	1.01	15.15	183	.38	.37	.01	331.
1.01	3.20	40	.01	.00	.01	4.	1.01	15.20	184	.57	.56	.01	371.
1.01	3.25	41	.01	.00	.01	4.	1.01	15.25	185	.67	.65	.01	449.
1.01	3.30	42	.01	.00	.01	4.	1.01	15.30	186	1.62	1.59	.03	607.
1.01	3.35	43	.01	.00	.01	4.	1.01	15.35	187	2.67	2.63	.04	981.
1.01	3.40	44	.01	.00	.01	4.	1.01	15.40	188	1.05	1.03	.01	1434.
1.01	3.45	45	.01	.00	.01	4.	1.01	15.45	189	.67	.66	.01	1582.
1.01	3.50	46	.01	.00	.01	4.	1.01	15.50	190	.57	.57	.01	1403.
1.01	3.55	47	.01	.00	.01	4.	1.01	15.55	191	.38	.38	.00	1101.
1.01	4.00	48	.01	.00	.01	4.	1.01	16.00	192	.38	.38	.00	858.
1.01	4.05	49	.01	.00	.01	4.	1.01	16.05	193	.29	.29	.00	678.
1.01	4.10	50	.01	.00	.01	4.	1.01	16.10	194	.29	.29	.00	546.
1.01	4.15	51	.01	.00	.01	5.	1.01	16.15	195	.29	.29	.00	458.
1.01	4.20	52	.01	.00	.01	5.	1.01	16.20	196	.29	.29	.00	401.
1.01	4.25	53	.01	.00	.01	5.	1.01	16.25	197	.29	.29	.00	370.
1.01	4.30	54	.01	.00	.01	5.	1.01	16.30	198	.29	.29	.00	352.
1.01	4.35	55	.01	.00	.01	5.	1.01	16.35	199	.29	.29	.00	341.
1.01	4.40	56	.01	.00	.01	5.	1.01	16.40	200	.29	.29	.00	334.
1.01	4.45	57	.01	.00	.01	5.	1.01	16.45	201	.29	.29	.00	330.
1.01	4.50	58	.01	.00	.01	5.	1.01	16.50	202	.29	.29	.00	329.
1.01	4.55	59	.01	.00	.01	5.	1.01	16.55	203	.29	.29	.00	328.
1.01	5.00	60	.01	.00	.01	5.	1.01	17.00	204	.29	.29	.00	328.

1.01	5.00	60	.01	.00	.01	5.
1.01	5.05	61	.01	.01	.01	5.
1.01	5.10	62	.01	.01	.01	6.
1.01	5.15	63	.01	.01	.01	6.
1.01	5.20	64	.01	.01	.01	6.
1.01	5.25	65	.01	.01	.01	6.
1.01	5.30	66	.01	.01	.01	6.
1.01	5.35	67	.01	.01	.01	6.
1.01	5.40	68	.01	.01	.01	6.
1.01	5.45	69	.01	.01	.01	6.
1.01	5.50	70	.01	.01	.01	6.
1.01	5.55	71	.01	.01	.01	6.
1.01	6.00	72	.01	.01	.01	6.
1.01	6.05	73	.07	.03	.04	8.
1.01	6.10	74	.07	.03	.04	13.
1.01	6.15	75	.07	.03	.03	20.
1.01	6.20	76	.07	.03	.03	26.
1.01	6.25	77	.07	.03	.03	30.
1.01	6.30	78	.07	.03	.03	33.
1.01	6.35	79	.07	.04	.03	35.
1.01	6.40	80	.07	.04	.03	37.
1.01	6.45	81	.07	.04	.03	38.
1.01	6.50	82	.07	.04	.03	40.
1.01	6.55	83	.07	.04	.03	41.
1.01	7.00	84	.07	.04	.03	42.
1.01	7.05	85	.07	.04	.02	43.
1.01	7.10	86	.07	.04	.02	44.
1.01	7.15	87	.07	.04	.02	45.
1.01	7.20	88	.07	.04	.02	46.
1.01	7.25	89	.07	.04	.02	47.
1.01	7.30	90	.07	.04	.02	47.
1.01	7.35	91	.07	.04	.02	48.
1.01	7.40	92	.07	.05	.02	49.
1.01	7.45	93	.07	.05	.02	50.
1.01	7.50	94	.07	.05	.02	50.
1.01	7.55	95	.07	.05	.02	51.
1.01	8.00	96	.07	.05	.02	52.
1.01	8.05	97	.07	.05	.02	52.
1.01	8.10	98	.07	.05	.02	53.
1.01	8.15	99	.07	.05	.02	53.
1.01	8.20	100	.07	.05	.02	54.
1.01	8.25	101	.07	.05	.02	54.
1.01	8.30	102	.07	.05	.02	55.
1.01	8.35	103	.07	.05	.02	55.
1.01	8.40	104	.07	.05	.02	56.
1.01	8.45	105	.07	.05	.01	56.
1.01	8.50	106	.07	.05	.01	57.
1.01	8.55	107	.07	.05	.01	57.
1.01	9.00	108	.07	.05	.01	57.
1.01	9.05	109	.07	.05	.01	58.
1.01	9.10	110	.07	.05	.01	58.
1.01	9.15	111	.07	.05	.01	58.
1.01	9.20	112	.07	.05	.01	59.
1.01	9.25	113	.07	.05	.01	59.
1.01	9.30	114	.07	.05	.01	59.
1.01	9.35	115	.07	.05	.01	60.
1.01	9.40	116	.07	.05	.01	60.
1.01	9.45	117	.07	.05	.01	60.
1.01	9.50	118	.07	.05	.01	61.
1.01	9.55	119	.07	.05	.01	61.
1.01	10.00	120	.07	.05	.01	61.

1.01	17.00	204	.29	.29	.00	328.
1.01	17.05	205	.23	.23	.00	323.
1.01	17.10	206	.23	.23	.00	309.
1.01	17.15	207	.23	.23	.00	291.
1.01	17.20	208	.23	.23	.00	276.
1.01	17.25	209	.23	.23	.00	268.
1.01	17.30	210	.23	.23	.00	264.
1.01	17.35	211	.23	.23	.00	261.
1.01	17.40	212	.23	.23	.00	260.
1.01	17.45	213	.23	.23	.00	259.
1.01	17.50	214	.23	.23	.00	258.
1.01	17.55	215	.23	.23	.00	258.
1.01	18.00	216	.23	.23	.00	258.
1.01	18.05	217	.02	.02	.00	243.
1.01	18.10	218	.02	.02	.00	194.
1.01	18.15	219	.02	.02	.00	154.
1.01	18.20	220	.02	.02	.00	144.
1.01	18.25	221	.02	.02	.00	134.
1.01	18.30	222	.02	.02	.00	125.
1.01	18.35	223	.02	.02	.00	117.
1.01	18.40	224	.02	.02	.00	109.
1.01	18.45	225	.02	.02	.00	102.
1.01	18.50	226	.02	.02	.00	95.
1.01	18.55	227	.02	.02	.00	88.
1.01	19.00	228	.02	.02	.00	83.
1.01	19.05	229	.02	.02	.00	77.
1.01	19.10	230	.02	.02	.00	72.
1.01	19.15	231	.02	.02	.00	67.
1.01	19.20	232	.02	.02	.00	63.
1.01	19.25	233	.02	.02	.00	58.
1.01	19.30	234	.02	.02	.00	54.
1.01	19.35	235	.02	.02	.00	51.
1.01	19.40	236	.02	.02	.00	47.
1.01	19.45	237	.02	.02	.00	44.
1.01	19.50	238	.02	.02	.00	41.
1.01	19.55	239	.02	.02	.00	38.
1.01	20.00	240	.02	.02	.00	36.
1.01	20.05	241	.02	.02	.00	34.
1.01	20.10	242	.02	.02	.00	31.
1.01	20.15	243	.02	.02	.00	29.
1.01	20.20	244	.02	.02	.00	27.
1.01	20.25	245	.02	.02	.00	25.
1.01	20.30	246	.02	.02	.00	24.
1.01	20.35	247	.02	.02	.00	23.
1.01	20.40	248	.02	.02	.00	23.
1.01	20.45	249	.02	.02	.00	23.
1.01	20.50	250	.02	.02	.00	23.
1.01	20.55	251	.02	.02	.00	23.
1.01	21.00	252	.02	.02	.00	23.
1.01	21.05	253	.02	.02	.00	23.
1.01	21.10	254	.02	.02	.00	23.
1.01	21.15	255	.02	.02	.00	23.
1.01	21.20	256	.02	.02	.00	23.
1.01	21.25	257	.02	.02	.00	23.
1.01	21.30	258	.02	.02	.00	23.
1.01	21.35	259	.02	.02	.00	23.
1.01	21.40	260	.02	.02	.00	23.
1.01	21.45	261	.02	.02	.00	23.
1.01	21.50	262	.02	.02	.00	23.
1.01	21.55	263	.02	.02	.00	23.
1.01	22.00	264	.02	.02	.00	23.

1.01	10.05	121	.07	.05	.01	61.	1.01	22.05	265	.02	.02	.00	23.
1.01	10.10	122	.07	.06	.01	62.	1.01	22.10	266	.02	.02	.00	23.
1.01	10.15	123	.07	.06	.01	62.	1.01	22.15	267	.02	.02	.00	23.
1.01	10.20	124	.07	.06	.01	62.	1.01	22.20	268	.02	.02	.00	23.
1.01	10.25	125	.07	.06	.01	62.	1.01	22.25	269	.02	.02	.00	23.
1.01	10.30	126	.07	.06	.01	63.	1.01	22.30	270	.02	.02	.00	23.
1.01	10.35	127	.07	.06	.01	63.	1.01	22.35	271	.02	.02	.00	23.
1.01	10.40	128	.07	.06	.01	63.	1.01	22.40	272	.02	.02	.00	23.
1.01	10.45	129	.07	.06	.01	63.	1.01	22.45	273	.02	.02	.00	23.
1.01	10.50	130	.07	.06	.01	63.	1.01	22.50	274	.02	.02	.00	23.
1.01	10.55	131	.07	.06	.01	64.	1.01	22.55	275	.02	.02	.00	23.
1.01	11.00	132	.07	.06	.01	64.	1.01	23.00	276	.02	.02	.00	23.
1.01	11.05	133	.07	.06	.01	64.	1.01	23.05	277	.02	.02	.00	23.
1.01	11.10	134	.07	.06	.01	64.	1.01	23.10	278	.02	.02	.00	23.
1.01	11.15	135	.07	.06	.01	64.	1.01	23.15	279	.02	.02	.00	23.
1.01	11.20	136	.07	.06	.01	64.	1.01	23.20	280	.02	.02	.00	23.
1.01	11.25	137	.07	.06	.01	65.	1.01	23.25	281	.02	.02	.00	23.
1.01	11.30	138	.07	.06	.01	65.	1.01	23.30	282	.02	.02	.00	23.
1.01	11.35	139	.07	.06	.01	65.	1.01	23.35	283	.02	.02	.00	23.
1.01	11.40	140	.07	.06	.01	65.	1.01	23.40	284	.02	.02	.00	23.
1.01	11.45	141	.07	.06	.01	65.	1.01	23.45	285	.02	.02	.00	23.
1.01	11.50	142	.07	.06	.01	65.	1.01	23.50	286	.02	.02	.00	23.
1.01	11.55	143	.07	.06	.01	66.	1.01	23.55	287	.02	.02	.00	23.
1.01	12.00	144	.07	.06	.01	66.	1.02	0.00	288	.02	.02	.00	23.
									SUM	32.24	29.72	2.52	34559.
										(819.)	(755.)	(64.)	(878.60)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1582.	379.	120.	120.	34572.
CMS	45.	11.	3.	3.	979.
INCHES		24.16	30.59	30.59	30.59
MM		613.58	777.09	777.09	777.09
AC-FT		188.	238.	238.	238.
THOUS CU M		232.	294.	294.	294.

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	100.30	100.00	105.60
STORAGE	60.	59.	94.
OUTFLOW	3.	0.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	102.81	0.00	75.	12.	0.00	18.50	0.00
.15	104.29	0.00	85.	13.	0.00	18.92	0.00
.20	105.58	0.00	94.	19.	0.00	18.83	0.00
.25	105.89	.29	96.	78.	3.75	17.17	0.00
.30	106.10	.50	98.	193.	4.42	16.08	0.00
.35	106.32	.72	100.	388.	4.67	15.92	0.00
.40	106.46	.86	101.	537.	5.00	15.83	0.00
.50	106.60	1.00	102.	727.	6.00	15.83	0.00
1.00	107.10	1.50	106.	1480.	11.08	15.83	0.00

PLATE A-1
Sheet 5 of 5

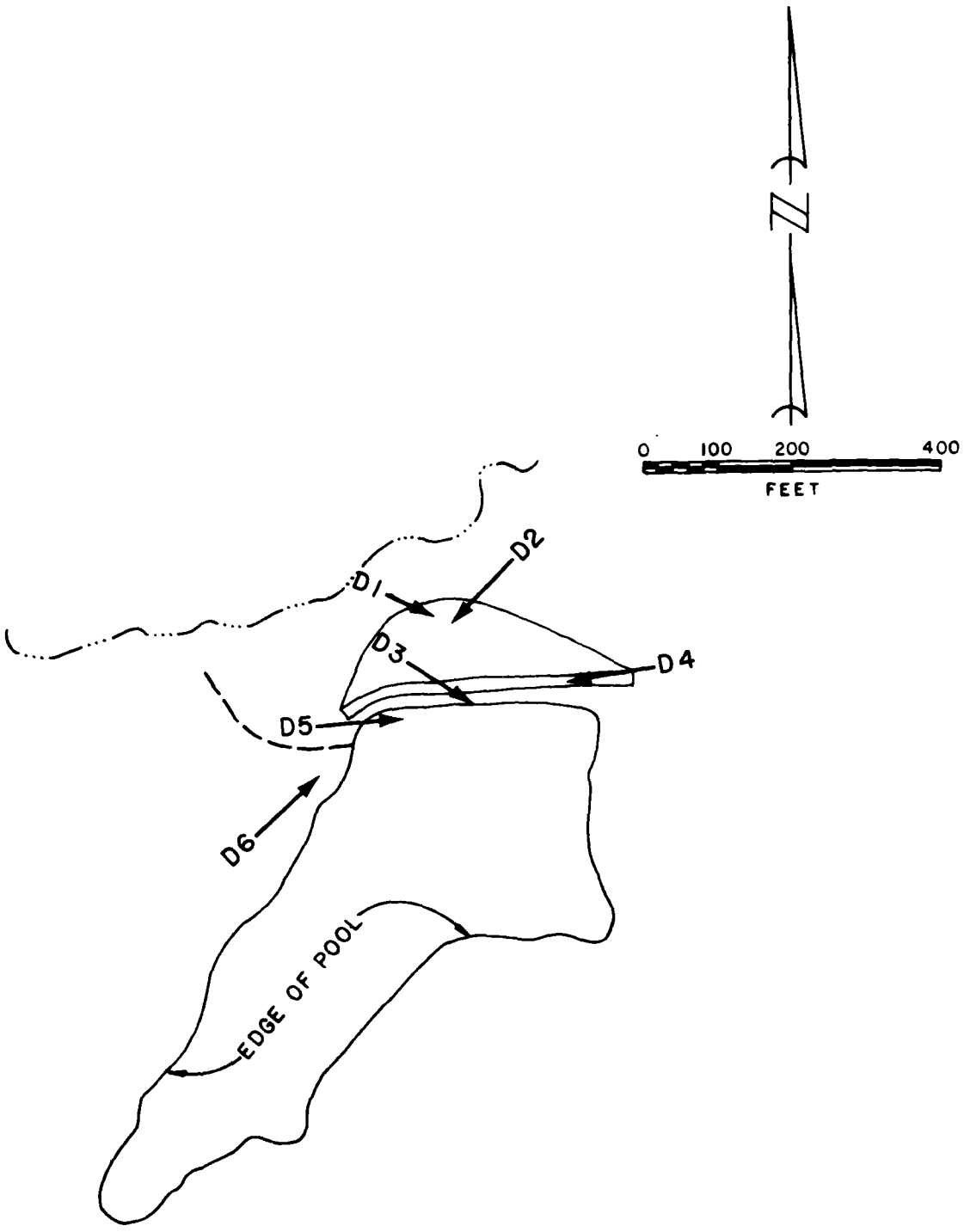


PHOTO INDEX I
FOR
DAM

NO NAME - 447
ST. CHARLES COUNTY, MO.
SEPTEMBER 1978

PREPARED BY
REITZ & JENS, INC.

D1

D2

D3

DAM

D4

D5

D6

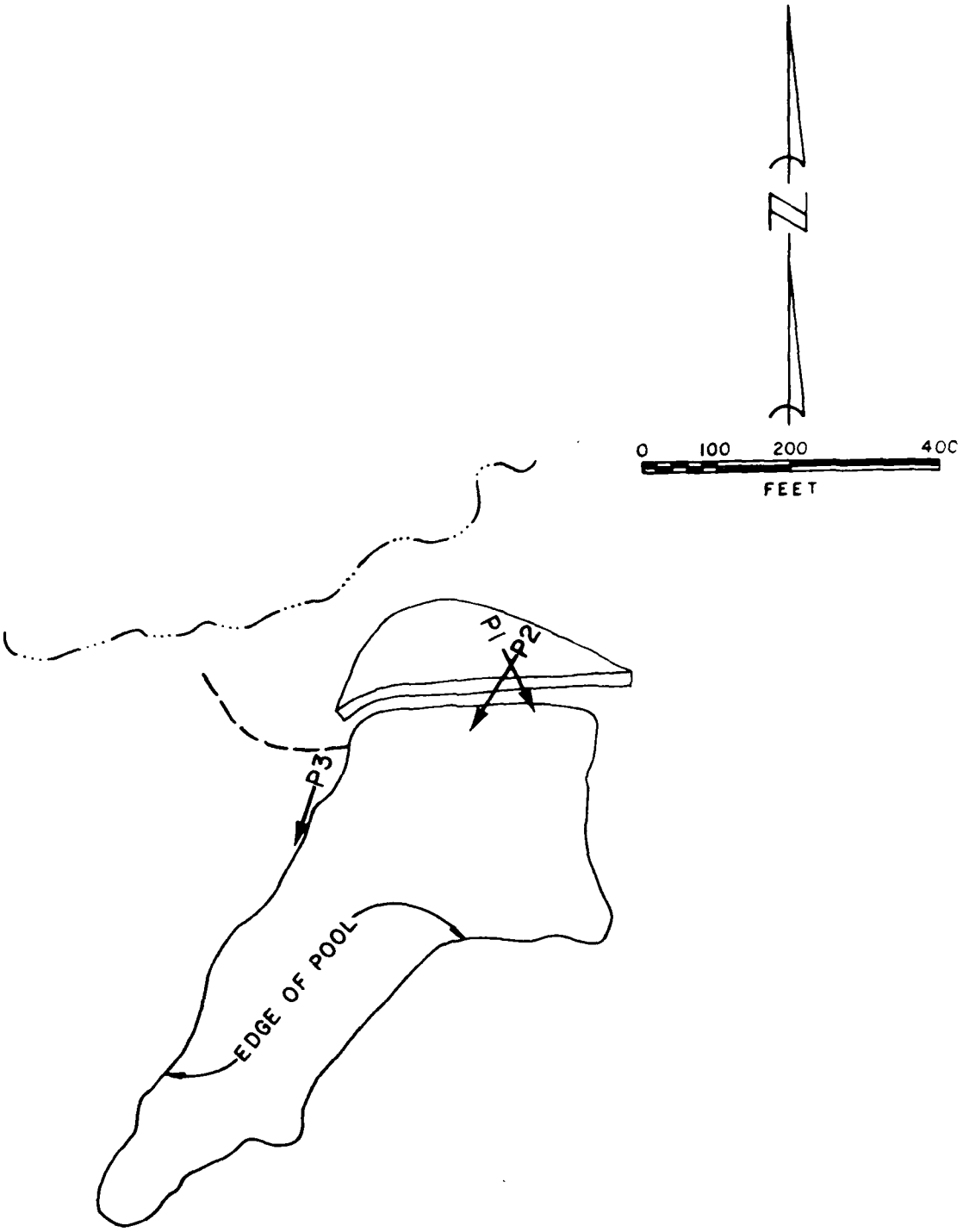


PHOTO INDEX 2
FOR
PANORAMA

NO NAME - 447
ST. CHARLES COUNTY, MO.
SEPTEMBER 1978

PREPARED BY
REITZ & JENS, INC

P1

P2

P3

PANOR...

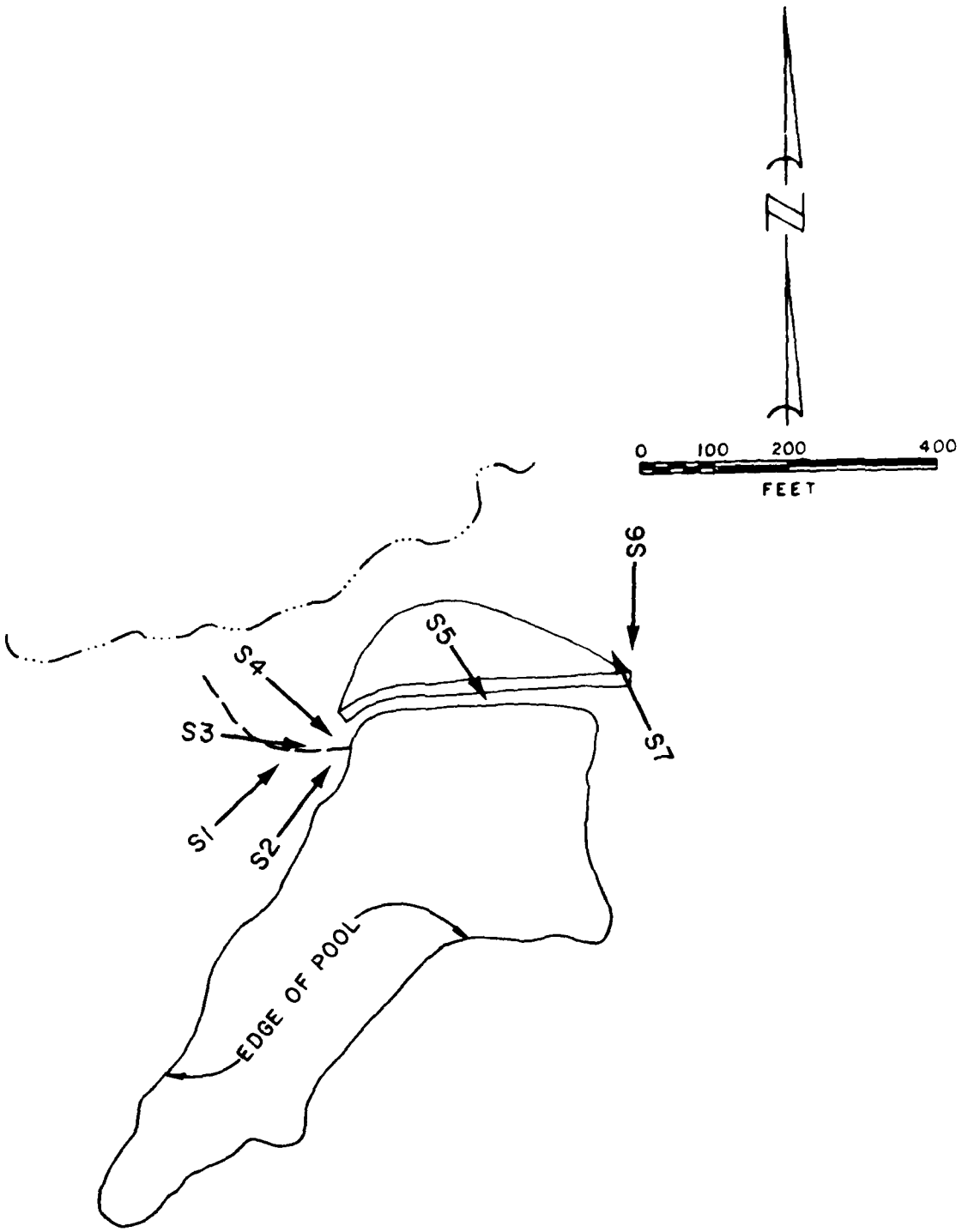


PHOTO INDEX 3
FOR
SPILLWAYS

NO NAME - 447
ST. CHARLES COUNTY, MO.
SEPTEMBER 1978

PREPARED BY
REITZ & JENS, INC

SPILLWAYS

S 5

S 6

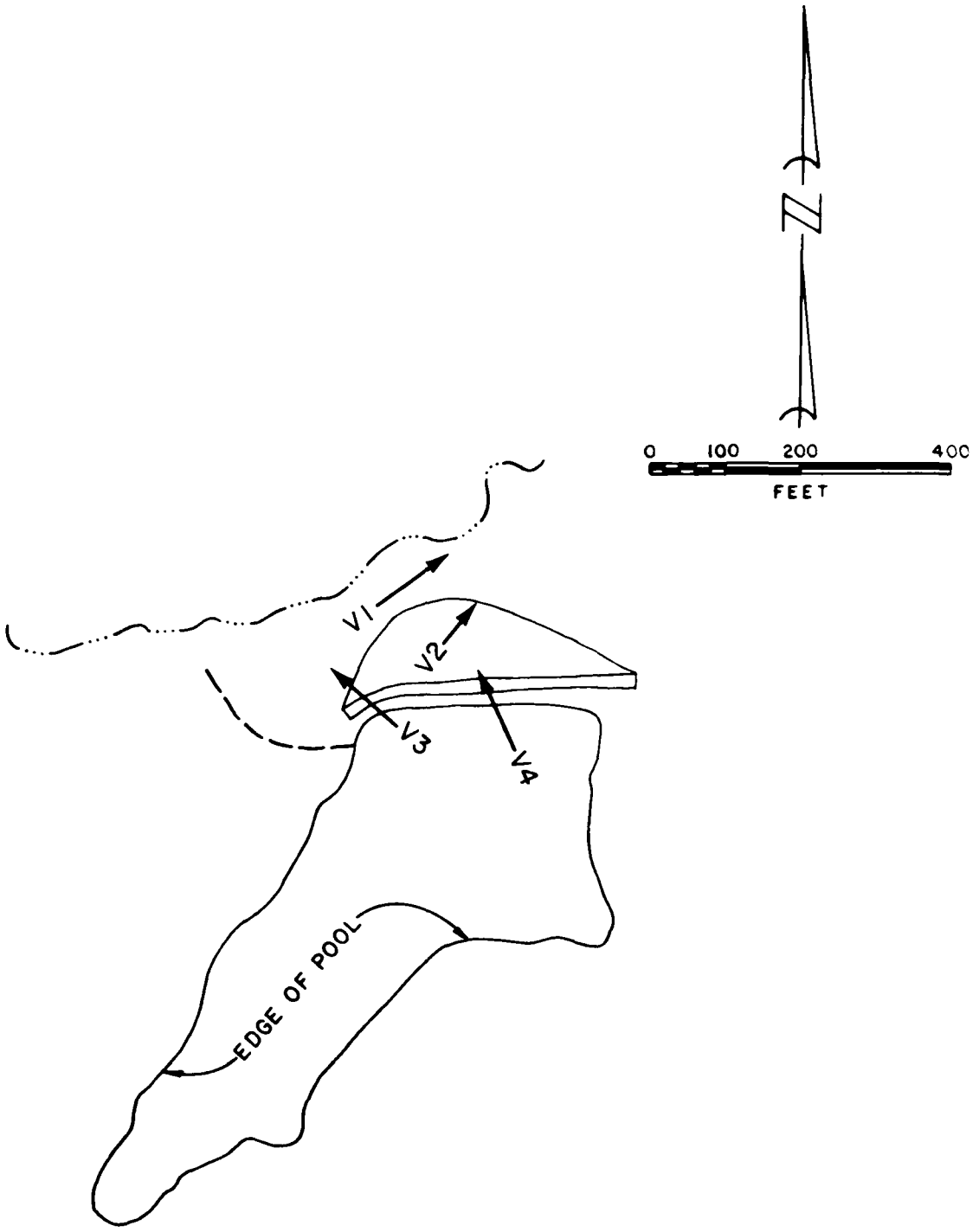
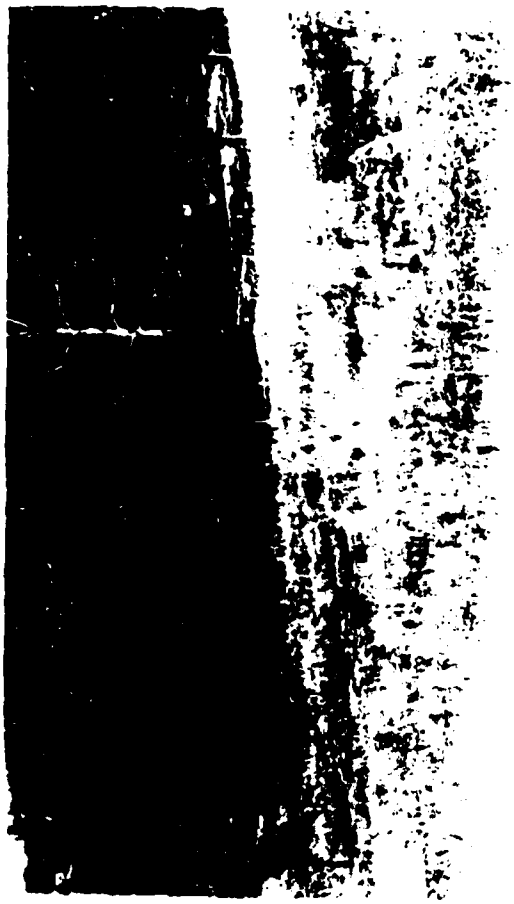


PHOTO INDEX 4
FOR
VALLEY BELOW DAM

NO NAME - 447
ST. CHARLES COUNTY, MO.
SEPTEMBER 1978

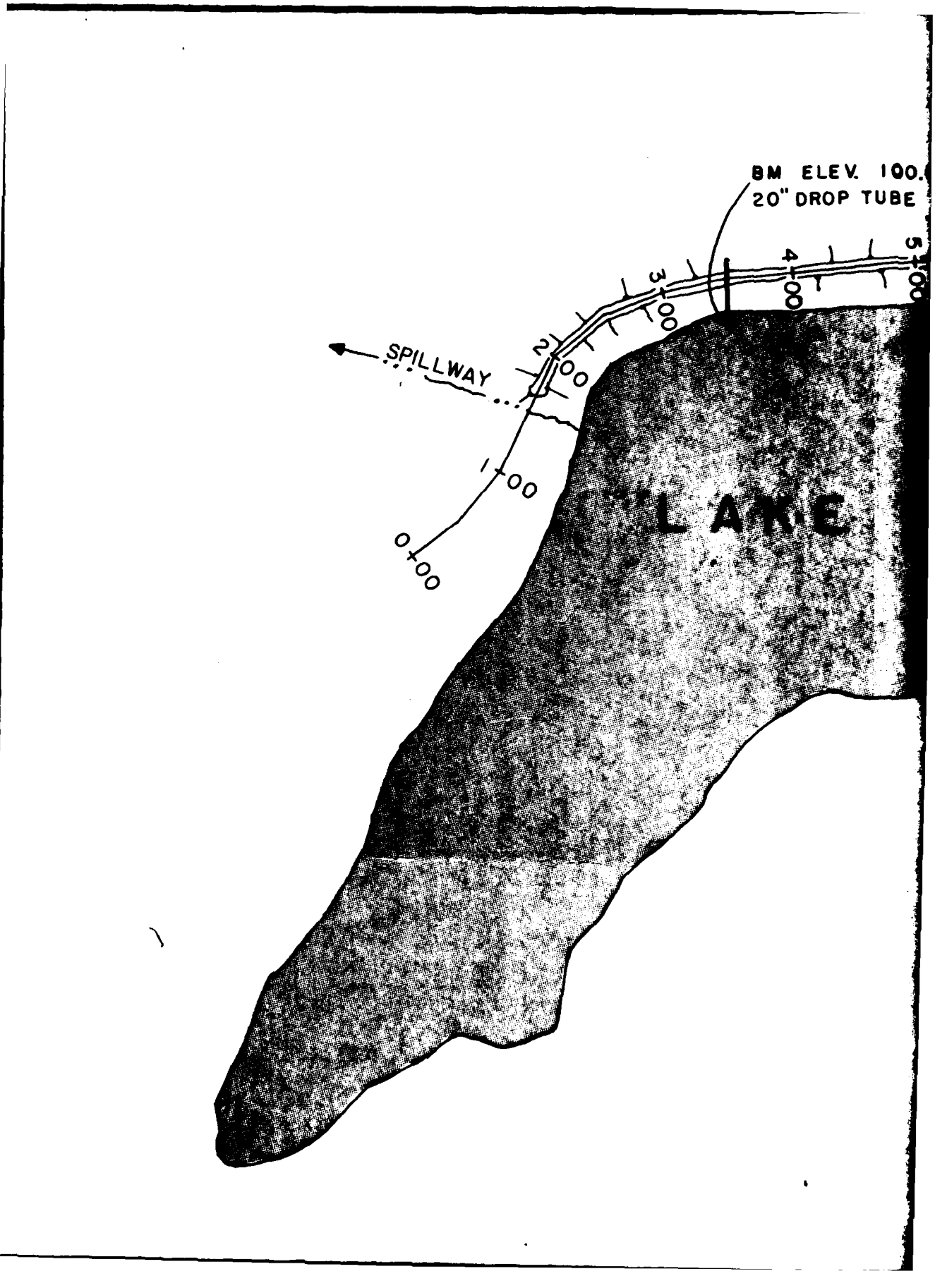
PREPARED BY
REITZ & JENS, INC

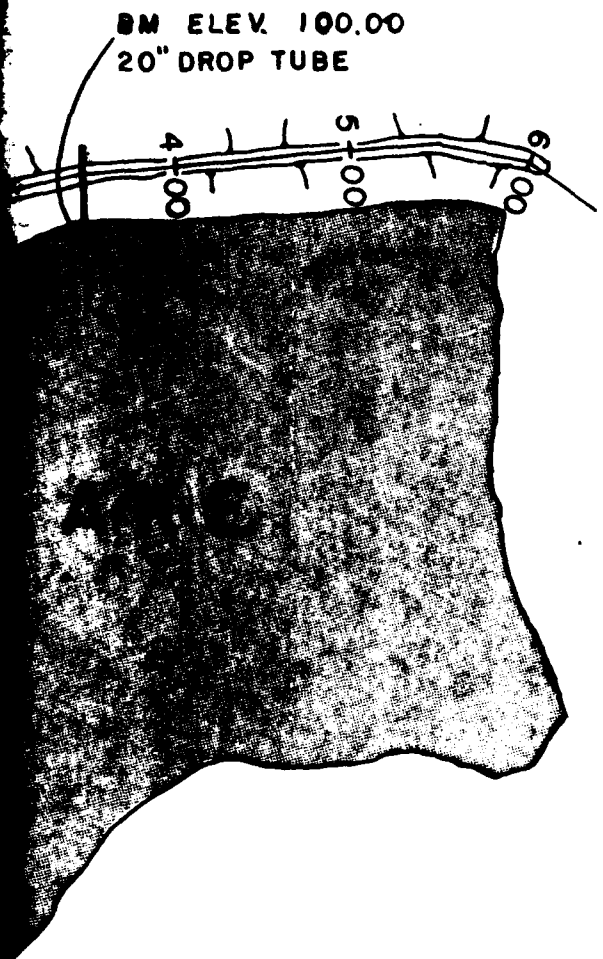


V 4

V 1

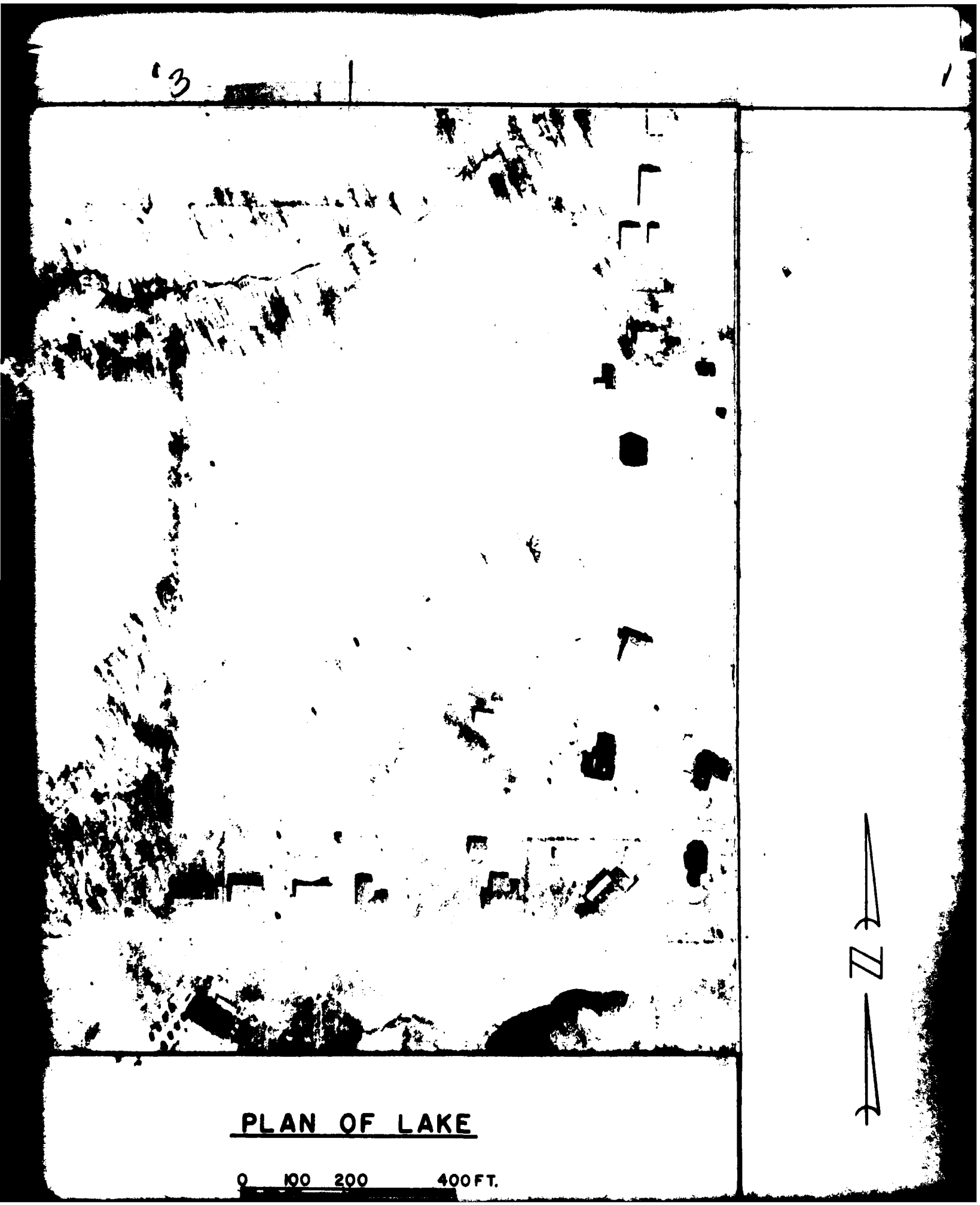
VALLEY BELOW DAM


BM ELEV. 100.
20" DROP TUBE
5+00
4+00
3+00
2+00
1+00
0+00
SPILLWAY
LAKE



N

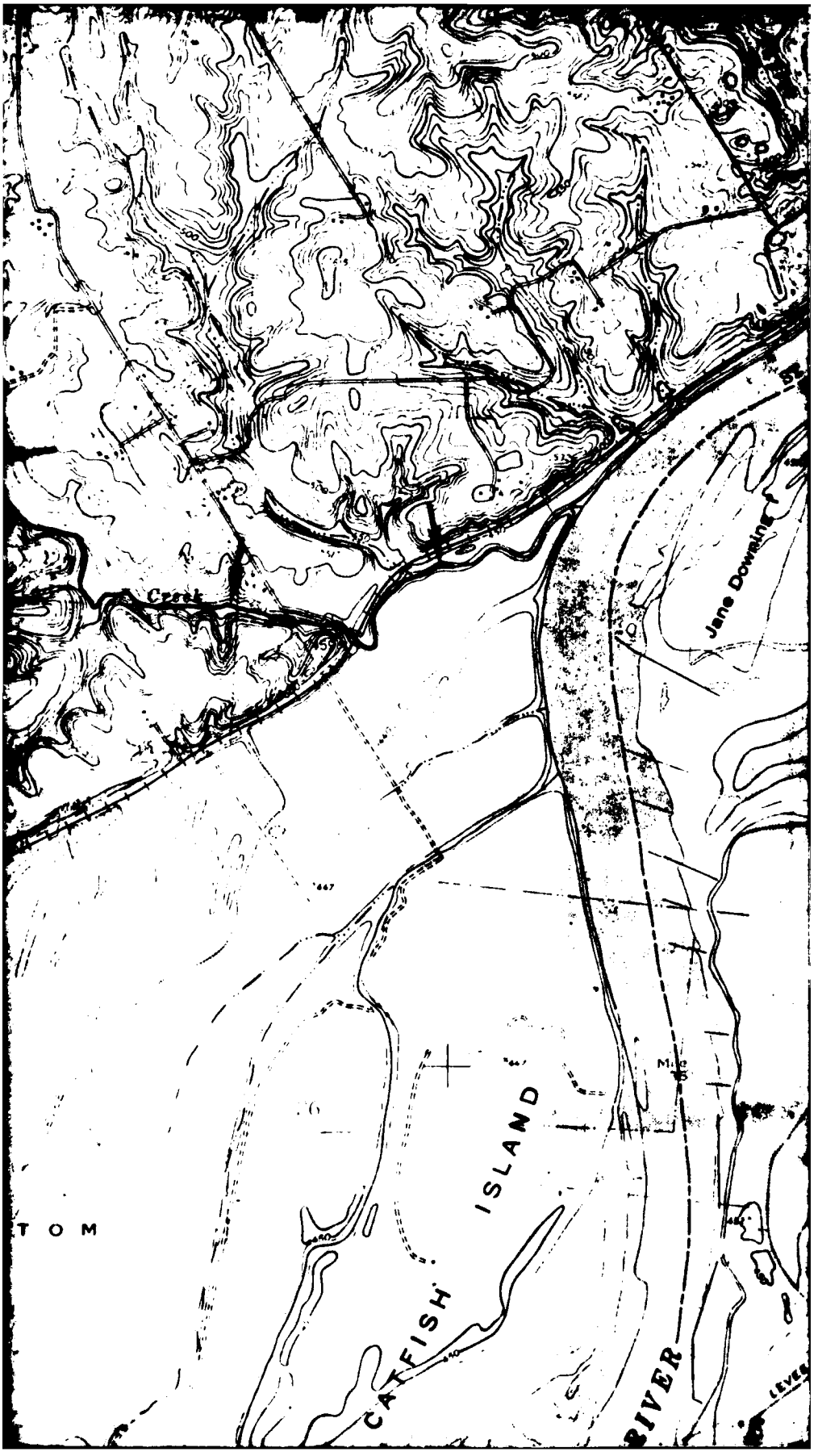
D SPILLWAY



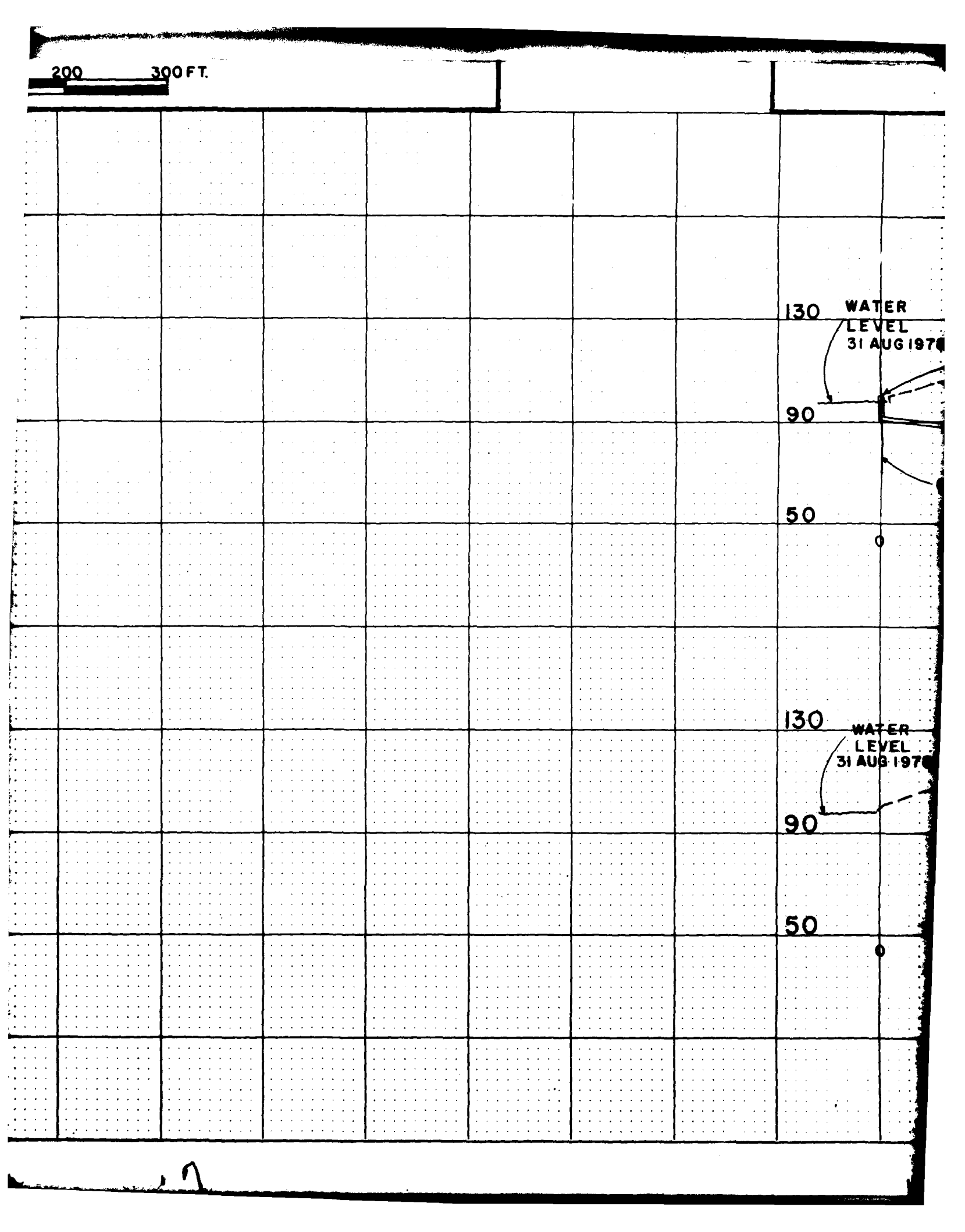
PLAN OF LAKE

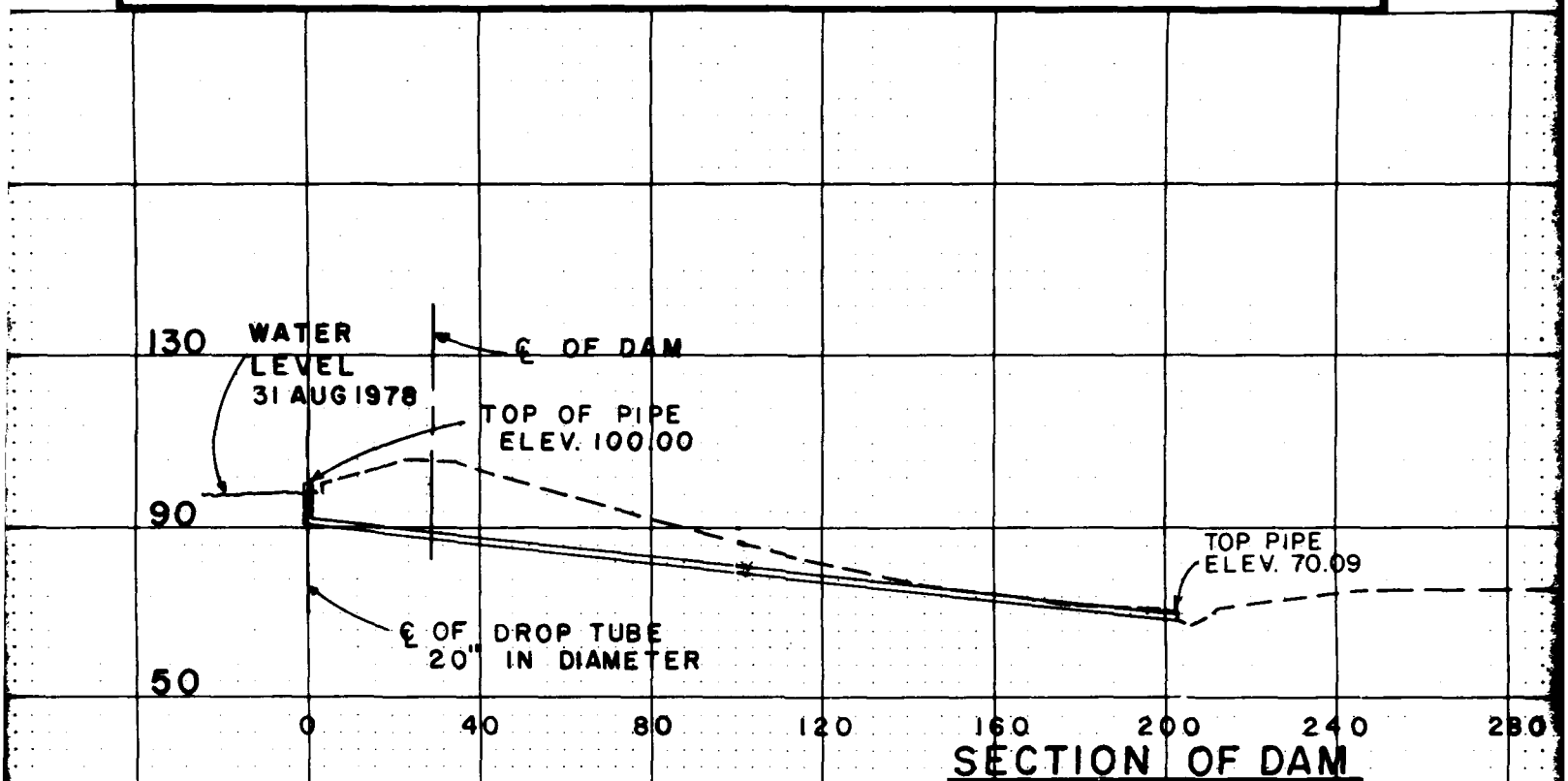
0 100 200 400 FT.

WATERSHED AND OUTFLOW C

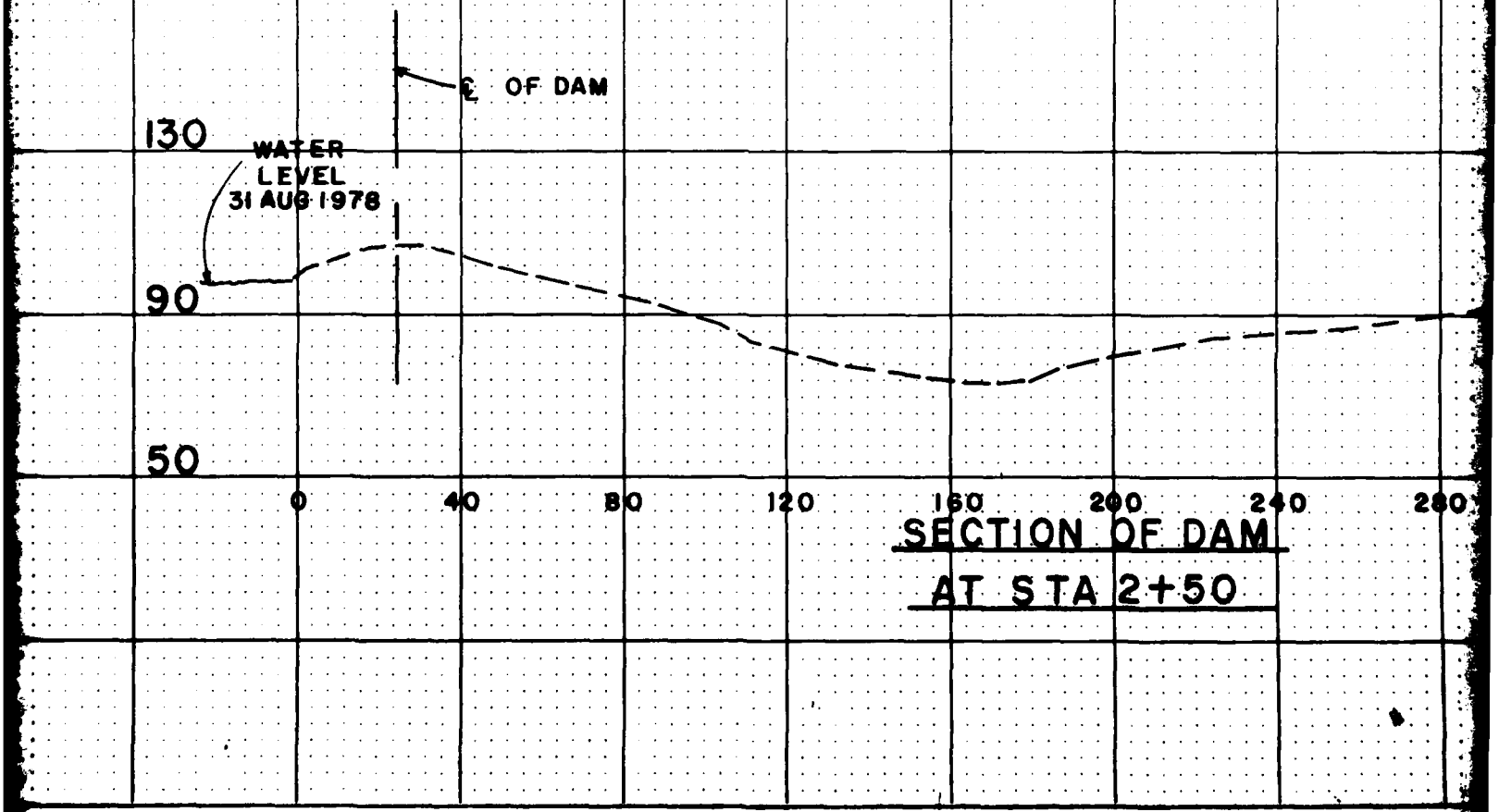

Creek
Jane Downing
TOM
CATFISH ISLAND
RIVER

ORIGINAL SURVEY		BY	DATE
NOTE BOOK NO.	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
	AREAS CHECKED		

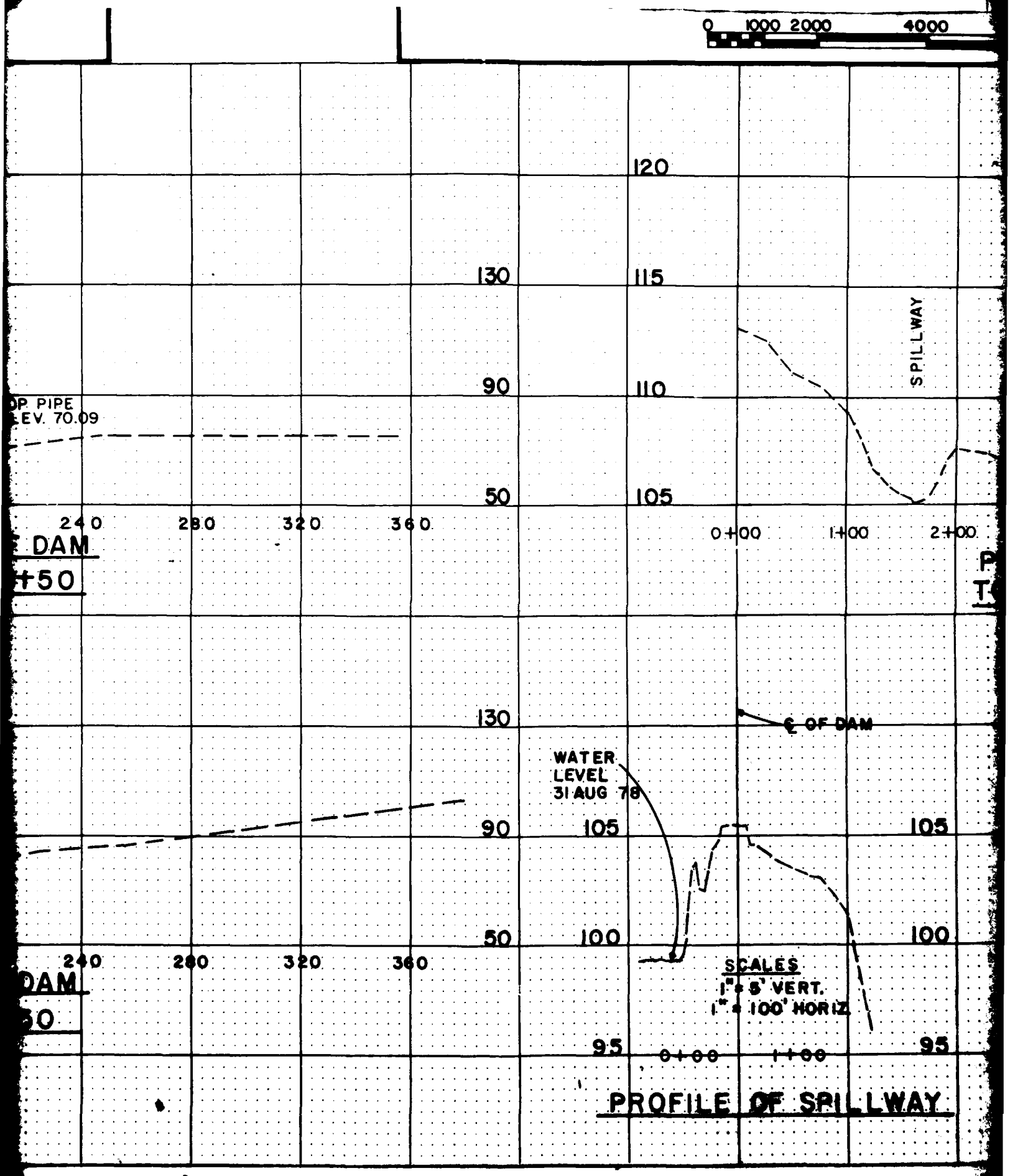

200
300 FT.
130
WATER
LEVEL
31 AUG 197
90
50
0
130
WATER
LEVEL
31 AUG 197
90
50
0



SECTION OF DAM AT STA 3+50



SECTION OF DAM AT STA 2+50


0 1000 2000 4000
120
115
130
110
90
SPILLWAY
OP. PIPE
EV. 70.09
105
50
240
280
320
360
0+00
1+00
2+00
DAM
+50
130
℄ OF DAM
WATER
LEVEL
31 AUG 78
105
90
105
100
50
100
240
280
320
360
SCALES
1" = 5' VERT.
1" = 100' HORIZ.
95
0+00
1+00
95
PROFILE OF SPILLWAY

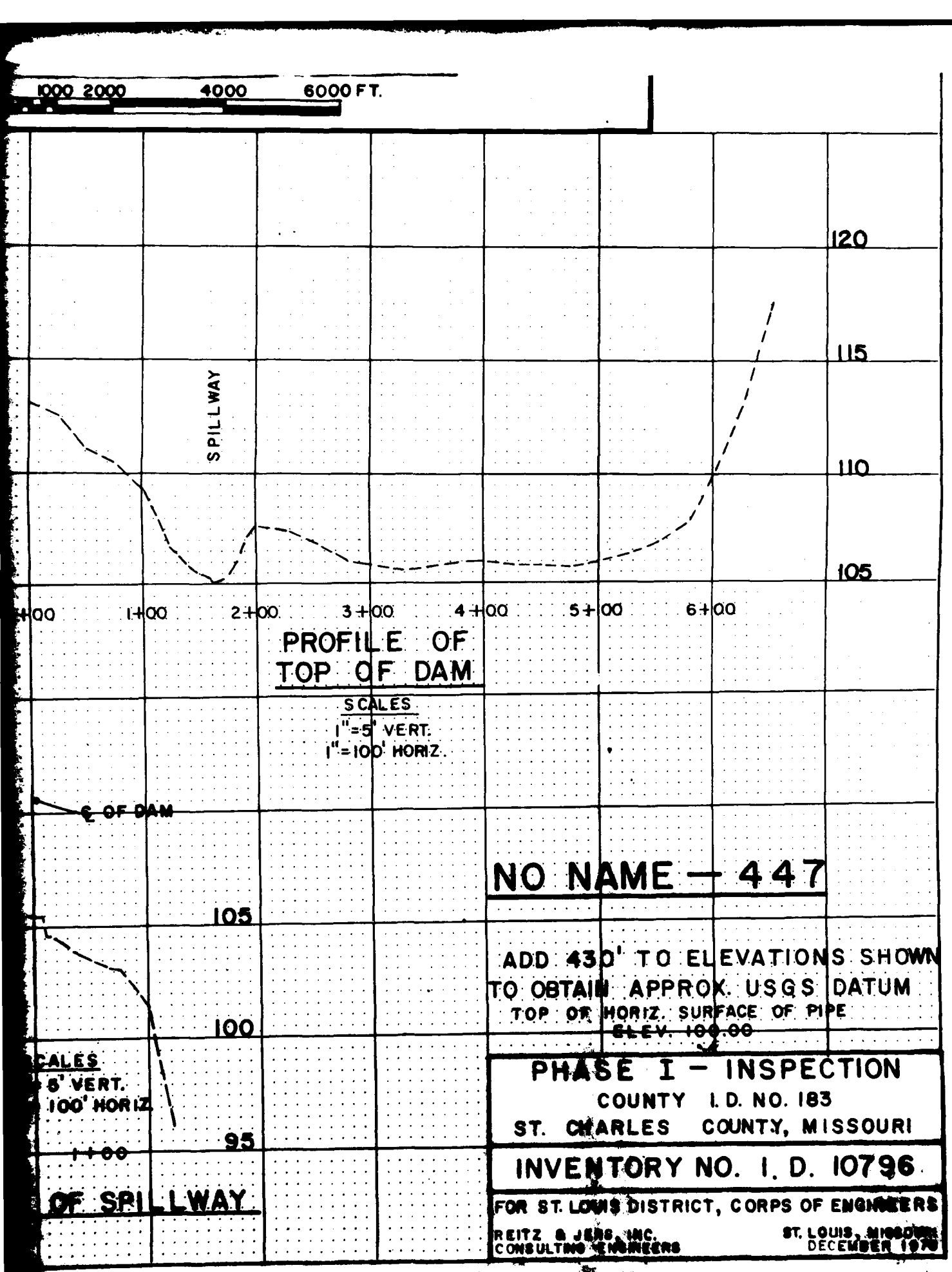

1000 2000 4000 6000 FT.
120
115
110
105
SPILLWAY
1+00
1+00
2+00
3+00
4+00
5+00
6+00
PROFILE OF
TOP OF DAM
SCALES
1"=5' VERT.
1"=100' HORIZ.
℄ OF DAM
105
100
95
CALES
5' VERT.
100' HORIZ.
1+00
OF SPILLWAY
NO NAME — 447
ADD 430' TO ELEVATIONS SHOWN
TO OBTAIN APPROX. USGS DATUM
TOP OF HORIZ. SURFACE OF PIPE
ELEV. 100.00
PHASE I — INSPECTION
COUNTY I. D. NO. 183
ST. CHARLES COUNTY, MISSOURI
INVENTORY NO. I. D. 10796
FOR ST. LOUIS DISTRICT, CORPS OF ENGINEERS
REITZ & JENS, INC.
CONSULTING ENGINEERS
ST. LOUIS, MISSOURI
DECEMBER 1978

PLATE 3


ND
DATE
ILMED